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ALTERNATIVE POLICIES FOR POLLUTION ABATEMENT

THE ONTARIO PULP
AND PAPER INDUSTRY

Government
Publications

DRAFT FOR DISCUSSION
VOLUME I



Ontario

Ministry
of the
Environment

The Honourable
George A. Kerr, Q.C.,
Minister

Everett Biggs,
Deputy Minister

ALTERNATIVE POLICIES FOR POLLUTION ABATEMENT:
THE ONTARIO PULP AND PAPER INDUSTRY

FOR DISCUSSION PURPOSES
VOLUME I

October 1974

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P R E F A C E

This report was completed in draft form, in October 1974. It was intended to provide background information and analysis as a basis for new policy initiatives.

In preparation for this printing of the report, many of the typing errors in the original draft version have been corrected though doubtless some remain. No changes of substance have been made.

A summary volume which was also prepared in 1974 has been updated and replaced by a volume entitled Alternative Policies for Pollution Abatement: The Ontario Pulp and Paper Industry. Summary and Update, October 1976.

October 1976.



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TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	ix
LIST OF FIGURES	xiv
CHAPTER 1 - INTRODUCTION	1
A. Background	1
B. Objective	2
C. Plan of the Study	3
D. Limitations of the Study	4
CHAPTER II - SURVEY OF EXISTING LEGAL INSTRUMENTS OF POLLUTION CONTROL FOR THE PULP AND PAPER INDUSTRY IN ONTARIO	6
A. Introduction	7
B. Constitutional Division of Powers	19
C. Statutory Instruments	19
1. Introduction	21
2. Regulatory Instruments for Pollution Control	21
a. ONTARIO	21
i Ministry of Environment Act	21
ii Environmental Protection Act	21
iii Ontario Water Resources Act	26
iv Public Health Act	30
v Public Health Act	30
vi Act to Establish the Ministry of Natural Resources	32
vii Lakes and Rivers Improvement Act	32
viii Public Lands Act	35
b. CANADA	37
i Fisheries Act	37
ii Canada Water Act	39
iii Harbour Commissions Act	42
iv Natural Harbours Board Act	42
v Navigable Waters Protection Act	43
vi International River Improvements Act, International Boundary Waters Treaty ..	43
vii Migratory Birds Convention Act	44
viii Clean Air Act	44

TABLE OF CONTENTS - Continued

	<u>Page</u>
3. Criminal Law	46
a. CANADA	46
i Criminal Code	46
4. Regulatory Instruments for Forestry Activities ...	47
a. ONTARIO	47
i Crown Timber Act	47
ii Forestry Act	50
iii Woodlands Improvement Act	50
iv Provincial Parks Act	50
v Wilderness Area Act	51
vi Settler's Pulpwood Protection Act	51
b. CANADA	52
i National Parks Act	52
ii Timber Marketing Act	52
5. Taxation Instruments	53
a. ONTARIO	53
i Income Tax Act	53
ii Retail Sales Tax Act	53
iii Pollution Abatement Incentive Act	54
iv Assessment Act	54
v Provincial Land Tax Act	55
vi Logging Tax Act	55
b. CANADA	56
i Excise Tax Act	56
ii Customs Act	56
iii Customs Tariff Act	56
iv Export Tax	56
6. Industrial and Regional Development Instruments ..	57
a. ONTARIO	57
i Ministry of Treasury, Economics and Intergovernmental Affairs Act	57
ii Northern Ontario Development Corporation Act	57
b. CANADA	58
i Department of Regional Economic Expansions Act	58
ii Regional Development Incentives Act	59
iii Industrial Development Bank Act	60
7. Research Incentives	61
a. CANADA	61
i Forestry Improvements and Research Act ..	61
ii Industrial Research and Development Incentives Act	61

TABLE OF CONTENTS - Continued

	<u>Page</u>
8. Agencies which Administer the Statutes	61
a. ONTARIO	63
b. CANADA	65
D. Municipal Powers	67
E. Prosecutions of Pulp and Paper Companies	70
F. Private Remedies	73
1. Introduction	73
2. Nuisance	73
3. Interference with Riparian Rights	77
4. Other "Causes of Action"	80
5. Private Rights and Government Enforcement	81
6. Obstacles to Common Law Remedies	83
7. Footnotes to Section F	87
CHAPTER III - ANALYSIS OF MARKET CONDITIONS AND STRUCTURE OF THE INDUSTRY	90
A. Introduction	90
1. Objectives	90
2. Methodology	90
B. Importance of the Pulp and Paper Industry to Ontario .	91
C. Identification of Markets Relevant to the Ontario Pulp and Paper Industry	96
1. Introduction	96
2. Pulp Market	96
3. Newsprint Market	109
4. Paper and Paperboard Markets	112
5. Location of Consumers	115
6. Major Pulp and Paper Producing Areas	118
D. Conditions of the Market	122
1. Introduction	122
2. Market Pulp	135
3. Newsprint	146
4. Fine Papers	160
5. Paperboard	170
6. Wrapping and Tissue Paper	177

TABLE OF CONTENTS - Continued

	<u>Page</u>
E. Structure of the Ontario Pulp and Paper Industry	182
1. Introduction	182
2. Concentration, Product Mix and Growth in the Pulp and Paper Industry of Ontario and Canada	183
3. Mill Size	196
4. Vertical Integration, Diversification and Ownership Patterns	201
F. Competitive Cost Position of the Ontario Pulp and Paper Industry	208
1. Introduction	208
2. United States	211
3. Sweden	219
4. Canada	221
G. Competition in the Pulp and Paper Industry	224
H. Profitability	227
1. Introduction	227
2. Data Limitations	229
3. Procedure	230
4. Profitability of the Ontario Pulp and Paper Industry	231
5. Financial Conditions of Firms	253
I. Summary and Conclusions	254
1. Economic Characteristics of the Industry	254
2. Competitive Costs	259
3. Profitability	260
4. Potential for Closure	261
CHAPTER IV - ANALYSIS OF MARKET CONDITIONS AND STRUCTURE OF THE INDUSTRY	266
A. Introduction	266
B. Wastewater Discharges	270
C. Effects of Paper Mill Effluents on Water Quality	280
D. Uses of Watercourses Affected by Pulp & Paper Mills	287
E. Benefits of Water Pollution Abatement by the Ontario Pulp and Paper Industry	292

TABLE OF CONTENTS - Continued

	<u>Page</u>
CHAPTER V - IMPORTANCE TO COMMUNITIES	308
A. Introduction	308
B. Mill Employment	310
C. Conclusion	312
CHAPTER VI - EVALUATION OF ALTERNATIVE WATER POLLUTION CONTROL POLICIES FOR THE PULP AND PAPER INDUSTRY IN ONTARIO	316
A. Introduction	316
1. Policy Programs and Policy Instruments	316
2. Criteria for Assessing Policy Programs	320
a. Environmental Effects	320
b. Cost to the Company	321
c. Cost to the Provincial and Federal Governments	321
d. Economic and Social Effects on the Area Surrounding the Mills	322
e. Equity	322
f. Administrative Feasibility	324
3. Economic Incentives and Financial Assistance	324
B. The Current Policy Program	326
1. General Description	326
2. Assessment	328
a. Environmental Effects	328
b. Cost to the Company	330
c. Cost to the Provincial and Federal Governments	336
d. Economic and Social Effects on the Area Surrounding the Mills	340
e. Equity	342
f. Administration	348
C. An Alternative Policy Program Employing a Conventional Effluent Charge	350
1. General Description	350
2. Assessment	353
a. Environmental Effects	353
b. Cost to the Company	359
c. Cost to the Provincial and Federal Governments	370
d. Economic and Social Effects on the Area Surrounding the Mills	376
e. Equity	379
f. Administration	382

TABLE OF CONTENTS - Continued

	<u>Page</u>
D. Direct Financial Assistance Programs	384
1. General Description	384
2. Assessment	385
a. Financial Assistance as a Stimulus to Pollution Control	388
b. Financial Assistance and the Kind of Pollution Control	388
c. The Administration of Direct Financial Assistance Programs	390
E. A Suggested Policy Program for Controlling Water Pollution from the Ontario Pulp and Paper Industry ...	393
1. General Description	393
2. Pollution Control Delay Penalties	395
a. PCDP1 and PCDP2 Defined	396
b. PCDP1 and PCDP2 Compared	397
3. Assessment	405
a. Environmental Effects	406
b. Cost to the Company	407
c. Cost to the Provincial and Federal Governments	409
d. Economic and Social Effects on the Area Surrounding the Mills	410
e. Equity	410
f. Administration	412
F. Conclusion	416
BIBLIOGRAPHY	417
APPENDIX A - Original Research Proposal, "Alternative Policies for Pollution Abatement: The Ontario Pulp and Paper Industry"	
APPENDIX B - Documentation Regarding Experience with Policy Instruments in Other Areas	
1. A. Penman, "The Experience with the Effluent Charge Scheme of the City of Winnipeg (February 14, 1974)	
2. John Demakes, "Effluent Charge Schemes in Canada (other than Winnipeg)	

TABLE OF CONTENTS - Continued

	<u>Page</u>
APPENDIX C - Federal Regulations Concerning Pulp and Paper Mill Effluents	
1. The 1971 Federal Pulp and Paper Mill Effluent Regulations	
2. Chlor-Alkali Mercury Regulations	
APPENDIX D - Statistical Series on Pulp and Paper Production in Ontario and Canada	
APPENDIX E - Comments by Murray German and John Ralston of the Ontario Ministry of the Environment Regarding the Effects of Pulp and Paper Mill Effluents on Water Quality Under Three Alternative Effluent Conditions	
APPENDIX F - Uses of Each Waterbody which Receives Pulp and Paper Mill Effluents	
APPENDIX G - "Analysis of Waste Treatment Alternatives: Eddy Forest Products Limited, Espanola and Abitibi Paper Co. Limited, Iroquois Falls", by Philip Wormwell and Peter Victor. Supplement by Peter Victor	
APPENDIX H - Procedure for Estimating Mill Costs, Revenues and Profits	

LIST OF TABLES

		<u>Page No.</u>
Table		
II-1	Jurisdiction Over Legal Instruments Provided by the British North America Act	9
II-2	Results of a Survey to Determine Whether Municipalities Having Pulp and Paper Mills Have Passed and Enforced By-Laws Regulating Waste Disposal of an Industrial Operation	68
II-3	Prosecutions of Pulp and Paper Companies	71
III-1	The Economic Importance of the Pulp and Paper Industry to Ontario	95
III-2	Production of Pulp, Newsprint and Paper Products, Canada and Selected Provinces - 1973	98
III-3	Production of Pulp Products in Canada and Ontario -, 1971	99
III-4	Mill Shipments and Values of Wood Pulp, 1971	104
III-5	Canadian Wood Pulp Exports by Grades for Selected Years	106
III-6	Sulfate Pulp Exports, By Area	108
III-7	Production, Shipments and Exports of News- print for Selected Years	111
III-8	Production of Paper and Paperboard in Canada and Ontario, 1971	113
III-9	Total Value of Shipments for Pulp and Paper Products from Canada and Ontario, 1971 ...	114
III-10	U.S. Pulp and Paper Production, Consumption, Imports and Exports, 1960, 1965 and 1972	117

List of Tables (Continued)

Page No.

Table

III-11	Comparison of the Ratio of Assets to Wages of Production Workers in Pulp and Paper Mills and Selected Industrial Sectors, 1969	123
III-12	Profit Ratios for Selected Pulp and Paper Companies Operating in Ontario	132
III-13	Mills Which Produce Market Pulp in Ontario ..	136
III-14	Production and Consumption of Newsprint in Canada and the United States	147
III-15	Operating Ratios of Individual Firms Which Operate Newsprint Mills in Eastern Canada	153
III-16	Newsprint Mills in Ontario	154
III-17	Shipments, Exports, Imports, and Value of Shipments of Groundwood Specialty, Printing, Book and Writing Paper Grades, Ontario and Canada	161
III-18	Fine Paper Mills in Ontario	163
III-19	Customs Tariffs for Pulp and Paper Products As of March, 1974	165
III-20	Paperboard Mills in Ontario	172
III-21	Paperboard Production, Shipments, Imports and Exports, Canada and Ontario	173
III-22	Wrapping and Tissue Paper Mills In Ontario ..	179
III-23	Newsprint Capacity - 1972	185
III-24	Concentration of Pulp and Paper Production Capacity in Ontario, 1971/72	187
III-25	Characteristics of the Canadian Pulp and Paper Industry, 1945-1971	188
III-26	Ownership, Products and Capacities of Operating Pulp and Paper Mills in Ontario, 1973	191

List of Tables (Continued)

Table	<u>Page No.</u>
III-27 Mill Size Distribution, Canada, 1971	197
III-28 Statistical Summary of Mill Size Distribution	200
III-29 Pulp and Paper Mills in Ontario Which are Foreign Owned	205
III-30 Average Annual Costs of Environmental Pro- tection in the United States Pulp and Paper Industry, 1971 - \$ Per Ton of Production	214
III-31 Sulfite Pulp Waste Liquor Treatment and Chemical Recovery Capital and Operating Cost Ranges	217
III-32 Profits of Pulp and Paper Companies in Canada	233
III-33 Ratio of Profits After Taxes to Capital Employed for Firms with Mills in Ontario	236
III-34 Ratio of Profits After Taxes to Sales for Firms with Mills in Ontario	237
III-35 Ratio of Cash Flow to Capital Employed for Firms with Mills in Ontario	239
III-36 Mills and Product Category for Which Cost and Revenue Data Are Provided	241
III-37 Summary of Actual Cost and Revenue Data for Aggregated Mills, 1971	245
III-38 Changes in Cost Components for the Pulp and Paper Industry, 1971-1974	246
III-39 Current Prices and Average Values for Various Pulp and Paper Products	248
III-40 Comparison of Average Profit Margins, 1971 and 1974	249

List of Tables (Continued)

Table	<u>Page No.</u>
III-41 Updated Costs, Revenues and Profits for Selected Mills, 1974	251
III-42 Capital Expenditures and Depreciation Incurred by Pulp and Paper Companies Operating in Ontario	255
III-43 Mills Considered to Have a High Potential for Closure Under Depressed Market Conditions	264
IV-1 Water Bodies Receiving Pulp and Paper Wastes	273
IV-2 Water Systems Receiving Mill Waste Waters Which Are Under Joint Jurisdictions	278
IV-3 Summary of Environmental Effects of Three Alternative Effluent Conditions	281
IV-4 Benefits of Pollution Abatement	293
IV-5 The Benefits of Pollution Control At Pulp and Paper Mills in Ontario	277
V-1 "One-Mill" Towns	313
V-2 Communities in Which One Or More Paper Mills Account for 25 Percent Or More of Manu- facturing Employment	314
V-3 Communities in Which Paper Companies Account for Less Than 10 Percent of Manufacturing Employment	315
VI-1 An Assessment of the Effectiveness of the Ministry's Recommended Treatment Pro- grammes for Achieving A Reduction in BOD ₅ Discharge	331
VI-2 Costs to Companies of Installing the Ministry's Recommended Treatment Programmes	335
VI-3 The Direct Costs to Government of the Ministry's Current Programmes for Two Mills	338

List of Tables (Continued)

Page No.

Table

VI-4	The Decline in Government Tax Revenues Resulting from the Adoption by Two Mills of the Ministry's Recommended Method of Pollution Control	339
VI-5	A Comparison of the Government and Company Costs of the Adoption of the Ministry's Recommended Pollution Controls at Two Mills	345
VI-6	Varieties of Effluent Charges and the Purposes They Can Serve	352
VI-7	Least Cost Analysis of Pollution Control at Two Mills Including An Effluent Charge....	357
VI-8i	Least Cost Programs for Pollution Control at Two Mills With An Effluent Charge and No Taxable Income (Case 2)	361
VI-8ii	Least Cost Programs for Pollution Control at Two Mills With An Effluent Charge and Normal Depreciation (Case 3)	362
VI-8iii	Least Cost Programs for Pollution Control at Two Mills With An Effluent Charge and Partial Accelerated Depreciation (Case 1*)	363
VI-8iv	Least Cost Programs for Pollution Control at Two Mills With An Effluent Charge and Full Accelerated Depreciation (Case 1) ...	364
VI-9i	Costs to Government of Pollution Control at Abitibi, Iroquois Falls With An Effluent Charge and Normal Depreciation (Equivalent Annual Cost \$000)	373
VI-9ii	Costs to Government of Pollution Control at Abitibi, Iroquois Falls With An Effluent Charge and Partial Accelerated Deprecia- tion (Equivalent Annual Cost \$000)	374
VI-10	Industrial Discharges of BOD ₅ and Suspended Solids in Ontario 1973.....	410

L I S T O F F I G U R E S

Figure		<u>Page No.</u>
III-1	Total Woodpulp Production Canada 1950 - 1971	125
III-2	Newsprint Production Canada 1945 - 1972	126
III-3	Wholesale Price Index Canada Pulp & Paper Mills	127
III-4	Estimated Capital Expenditure for the Canadian Pulp & Paper Industry	128
III-5	Operating Ratios Pulp & Newsprint	129
III-6	Sulfate Pulp - Production & Consumption	140
III-7	Export Price Index Bleached Kraft - Annual	141
III-8	Export Price Index Bleached Kraft - Monthly	142
III-9	Newsprint Canadian Production & Exports U.S. Consumption	148
III-10	Export Price Index Newsprint - Annual	151
III-11	Export Price Index Newsprint - Monthly	156
III-12	Industrial Selling Price Index Fine Papers - Annual	168
III-13	Industrial Selling Price Index Fine Papers - Monthly	169
III-14	Industrial Selling Price Indexes Paperboard Liners & Corrugating Materials - Annual	175
III-15	Industrial Selling Price Indexes - Paperboard Liners & Corrugating Materials - Monthly...	176
III-16	Industrial Selling Price Index - Kraft Wrapping Paper - Annual - Monthly 1973	181
IV-1	Linking the Value of Natural Water Systems to Waste Discharges	269

CHAPTER I

INTRODUCTION

INTRODUCTION

A. BACKGROUND

During 1972, it was recognized that an impasse had been reached with respect to the installation of further pollution abatement facilities in a number of major pulp and paper plants in Ontario. In response to this, and at the behest of Mr. Everett Biggs, Deputy Minister, Ministry of the Environment, several meetings were held among representatives of the Ministry of the Environment, the Ministry of Natural Resources and the Ministry of Treasury, Economics and Intergovernmental Affairs. These meetings resulted in a number of position statements and policy proposals and a consensus that a broad approach to the problems was required. However, no actual changes in policy came out of these meetings and the issue which gave rise to them, that of inactivity by pulp and paper plants in reducing their effluent loadings, has continued into 1974.

A second initiative was taken in mid-1973 by the Ministry of the Environment when it submitted proposals for a system of loans to the pulp and paper industry to assist with the financing of pollution control. This proposal was rejected because of arguments presented by the Ministry of Natural Resources to the effect that pollution control should be part of an industry wide rationalization program which was in the process of being worked out.

Since then, discussions have continued between representatives of the Ministry of the Environment and the Ministry of Natural Resources to see how and in what way industry rationalization, supported in part by funds from the Department of Regional Economic Expansion, could be achieved. Although it is premature to assess the outcome of these discussions, it seems unlikely that they will provide anything more than a partial solution to the problems of pollution control in the pulp and paper industry.

In view of these difficulties with the development of appropriate changes in policy and in the application of existing policies, the Strategic Planning Branch of the Ministry of the Environment undertook in July 1973 to study the pulp and paper industry and its problems in as broad a manner as possible. After the dissolution of the Strategic Planning Branch upon the reorganization of the Ministry in April 1974, responsibility for the study, which was already well under way, fell to the Special Studies Section of the Environmental Approvals Branch.

B. OBJECTIVE

The primary purpose of this study is to evaluate alternative policies for achieving increased pollution control in the Ontario pulp and paper industry. In order to achieve as comprehensive an evaluation as possible, it was necessary to gather data from numerous sources and to

develop a substantial quantity and range of information about the industry and the impact of its activities on the Ontario economy and environment.

In particular, the study investigates the present economic characteristics of the industry and the expected future profitability and growth of the industry; the environmental benefits of pollution control at each pulp and paper mill which discharges effluent directly into Ontario waters; the economic and social significance of these pulp and paper mills to the communities in which they are located; and the costs of various degrees of pollution control to the companies and to the provincial and federal governments.

On the basis of this information, much of which is developed on a mill by mill basis, alternative policies for pollution control are evaluated within the broad context of government goals for economic and social development as well as for pollution control.

C. PLAN OF THE STUDY

The study consists of five chapters, each of which is supported by one or more appendices. It begins in chapter II with a survey of the legal instruments for pollution control which are currently available under provincial and federal legislation. In chapter III, the structure of the pulp and paper industry and the economic

condition of the markets relevant to the industry in Ontario are analyzed. Environmental problems and the effects of specific changes in waste discharges at each mill are examined in chapter IV. Chapter V contains an assessment of the importance of each mill to its respective community and in chapter VI alternative policies for pollution control are described and analyzed in considerable detail.

D. LIMITATIONS OF THE STUDY

Due to limitations in time, resources and data, the study has been modified somewhat from the original research proposal (which is presented in Appendix A). While each component of the analysis has been studied as intended, the scope of the project has had to be limited in several ways. Detailed quantitative analysis of technical abatement alternatives and their costs have been completed for two mills rather than all of them. Furthermore, the analyses have been limited to water pollution because information about the technology and the costs of treating airborne emissions for pulp and paper plants is not readily available.

The analysis is also restricted to examining the consequences of applying alternative environmental policies to a single industrial sector. This may be deficient in that a plant belonging to one industrial sector may not be the only significant discharger of wastes to a particular water body or "air shed". Comprehensive regional programs

may be required to achieve equitable and efficient improvements in environmental quality when there are multiple sources of discharge into complex environmental systems. This is acknowledged by the Canada Water Act and the Canada Clean Air Act. However, administrative inertia, jurisdictional jealousies, interest group conflicts and the general absence of social mechanisms for implementing a comprehensive approach have led the federal authorities to adopt a direct regulatory approach based on the application of "best practicable technology" in processes and treatment throughout the country. Similarly, in Ontario comprehensive environmental management has not prevailed and the provincial policies and programs for pollution control have been specific to each industry. This study reflects this fact although the information and much of the policy analysis presented in the study has direct relevance to the development of regional environmental management programs in Ontario.

CHAPTER II

SURVEY OF EXISTING LEGAL INSTRUMENTS OF POLLUTION CONTROL FOR THE PULP AND PAPER INDUSTRY IN ONTARIO

SURVEY OF EXISTING LEGAL INSTRUMENTS OF
POLLUTION CONTROL FOR THE PULP AND PAPER
INDUSTRY IN ONTARIO

A. INTRODUCTION

Environmental policy programmes must be formulated and implemented in accordance with and in consideration of the legal framework of the province. This framework includes much more than the environmental statutes such as the Ontario Water Resources Act and the Environmental Protection Act. Laws which permit the taxation and regulation of the pulp and paper industry, court decisions, local bylaws, agency regulations and administrative policy are all important aspects of the legal environment worthy of consideration. It is necessary, therefore, to become informed about that part of the corpus juris which is relevant to pollution control and to the pulp and paper industry.

This chapter contains a survey of the various components of common law which can have a bearing on pollution abatement in the pulp and paper industry. This survey is accomplished in the following manner. The Constitutional division of powers among the federal, provincial and local governments are defined in section B as they relate to the environment. In section C there is a summary and annotation of federal and provincial statutory instruments pertaining directly to pollution control and those aspects of criminal law, industrial regulations, taxation and legal instruments for economic development and research which are relevant to environmental issues. The authority of the municipalities in which pulp and paper mills are located is investigated in section D. The investigation includes the results of a questionnaire and follow-up phone interviews. The record of prosecutions against pulp and paper companies by the Ministry of Environment is reported in section E. Prior to

current specific pollution control legislation, individuals sought redress and correction of pollution control damages through the common law courts. This avenue remains and is still used on occasion. The various "causes of action" for initiating private proceedings concerning environmental damages are discussed in section F along with a number of the landmark court decisions relevant to environmental law.

B. CONSTITUTIONAL DIVISION OF POWERS

There are three levels of government in Canada: federal, provincial and municipal. The British North America Act, which structured the original division of powers among them, has not been revised with respect to that division since 1867. It has been a charge upon the legislatures and the courts to translate the rigid, generalistic phrases of that document into a system adapted to the complexities of modern society. When, however, a whole new class of concern arises - one which was not even contemplated by the drafters of the B.N.A. Act - there can be no swift and final allocation of the power to encompass it. The courts proceed on a case-by-case basis and are loathe to speculate on contingencies beyond the facts at hand. From an examination of past precedents, they derive principles and analogies to govern present uncertainties. The result, unfortunately, can be a patchwork of strained interpretations, none of which resolutely faces the practical problem. Uncertainty of jurisdiction may inhibit development of an energetic, co-ordinated program at any level of government.

Environmental protection is a classic instance of this constitutional dilemma. There is no one national head of power covering all incidents of environmental degradation; jurisdiction to apply effective policy instruments is split, and sometimes shared, between all three levels of government.

It is important to note that the initial power to control any property lies with the entity which owns it, but that some other body may have concurrent or pre-emptive rights over that same property in certain circumstances. These non-proprietary law-making rights flow from the fact that the B.N.A. Act (sections 91, 92) assigned to each level of government the power to make laws in relation to certain classes of subject matter, regardless of where the actual ownership may reside.

The following Table II-1 represents a summary of the jurisdiction of the three levels of government over policy tools which might be brought to bear, directly and indirectly, on the pulp and paper industry in Ontario.¹ Note that municipalities have no original powers. They are creatures of the province by virtue of s.92(8) of the British North America Act. Each province may arrange a different balance of power between itself and its municipalities by delegating to them certain powers from within its own jurisdictional range. The municipality functions as a subsidiary of the province and cannot exercise powers assigned to the federal government.

1 For a lucid analysis see Dale Gibson, "Constitutional Jurisdiction Over Environmental Management in Canada", (1973) University of Toronto Law Journal, p. 86.

TABLE II-1

JURISDICTION OVER LEGAL INSTRUMENTS PROVIDED BY THE BRITISH NORTH AMERICA ACT

PART 1	FEDERAL		PROVINCIAL (Ontario)		MUNICIPAL (Ontario)	
	(a) Ownership of Land	Crown lands in National Parks, the Yukon and North-West Territories Lands set apart in the Third Schedule ² of the B.N.A. Act (s. 108) ² , including canals, public harbours, rivers and lake improvements, and "lands set apart for general public purposes" The federal government has the right to expropriate lands for its purposes.	All Crown land within provincial boundaries, except what expressly belongs to the federal government. (s. 117); includes the beds of navigable waters unless they are expressly conveyed to a private owner (Beds of Navigable Waters Act, R.S.O. 1970, c. 41)	Lands granted expressly to the municipality; lands bought or expropriated by the municipality; municipal works.		
(b) Ownership of Resources	Sub-surface and surface mineral rights follow ownership of land unless expressly excluded in original granting instrument.	Depends on the words of grant or deed for each individual property, or upon specific ownership rights conveyed by provincial statute. Generally, there is no incidence of municipal ownership of timber or mineral rights.				
	Ambient water is not capable of "Ownership"; riparian rights (rights of user belonging to the owner of lands through which a waterway flows) arise at common law, and not from any constitutional division of powers.	Provinces acquired full proprietary rights to natural resources (timber, minerals) within their boundaries, except those situate on or under lands belonging to the federal government (s.109) Provincial governments may sell, lease the lands, or the rights to the resources. ⁹²⁽⁵⁾ . An unrestricted sale or grant of land usually carries with it the timber and mineral rights; the rights conveyed may be restricted by the words of the deed or grant, or by a statute of general application.				

2 Unless otherwise specified, section numbers refer to the British North America Act.

TABLE II-1 Cont.

FEDERAL

PART I cont.

- (b) Ownership of Resources
Ambient air is likewise not subject to property rights, and there is no doctrine parallel to the riparian right guaranteeing rights of user.
- Timber rights run with ownership of land unless expressly excluded; this applies to any land held by the Crown in right of Canada, whether within provincial boundaries or not.

PART II

Express non-proprietary rights

91(10) *Navigation & Shipping*
viz.- regulating use and abuse of navigable waters

91(12) *Sea Coast and Inland Fisheries*
viz.- any condition or activity which may affect or alter suitability of waters for fishery purposes

91 (24) *Lands reserved for Indians*

92(10) (a) *Works and Undertakings connecting the province with any other or others of the provinces, or extending beyond the limits of the province.*

PROVINCIAL
(Ontario)

The same principles apply to provincial government as to federal, with respect to ambient air and water.

92(13) *Property and civil rights in the Province*

92(10) *Local works and undertakings in the Province*
(with certain exceptions reserved to the federal government, discussed under Part V, General Powers)

92(16) *All matters of a merely local or private nature in the province*

MUNICIPAL
(Ontario)

Municipal Act, R.S.O. 1970, c.246

By s.354(1).114 to .116 the council of a local municipality may make by-laws relating to nuisance, including industrial activity and manufacture.

By s.352 .48 and .49, all municipalities may pass by-laws regulating dumping of materials into harbours or bays within the municipality

TABLE II-1 Cont.

FEDERAL

PROVINCIAL
(Ontario)

MUNICIPAL
(Ontario)

PART II cont.

Express non-proprietary rights

It is upon these three heads of power that provincial governments base the broad powers they exercise over environmental controls. By virtue of an exclusive power over property and civil rights, and matters of a local or private nature, they achieve sole jurisdiction over private enterprise within provincial borders. Is is prima facie within their power and outside that of the federal government, to interfere with the primary civil right of a person or corporation to deal with his property or business as he sees fit. In consequence, whenever the federal government seeks to regulate private enterprise, it is obliged to demonstrate that this enterprise is not in fact "merely local", but possesses such a national character as to bring it within the general powers discussed in Part V of the Table, or to show that the aspect of the business being regulated is clearly a subject of federal jurisdiction - as with maintenance of fisheries.

By s.354(1).71 to .73, and .129, local municipalities have wide powers over their sewer systems, including the type of provision which must be made for disposal of industrial wastes.

Planning Act, R.S.O. 1970, c. 349

Municipal Councils and Planning Boards have the power to pass an "official plan", and complementary by-laws, and to develop a system of building regulations.

Public Health Act, R.S.O. 1970, c.377

Local boards of health, and officers of health, have considerable power to identify and order remediation of industrial nuisances-threats to the health or enjoyment of property of municipal residents.

TABLE II-1 Cont.

FEDERAL

PROVINCIAL
(Ontario)

MUNICIPAL
(Ontario)

PART III

Penal consequences

91(27) *The Criminal Law*
The criminal law in its widest sense is in the federal power. This includes a general power to define crime, and enumerate acts to be prohibited in the interest of public morality. It also extends to the prohibition of any act, with penal consequences, as part of the enforcement mechanism of any regulatory scheme.
This power is characterized as the most potent environmental tool in federal hands.

92(15) *The imposition of punishment by fine, penalty or imprisonment by way of enforcing a provincial statute.*
Provincial power to impose penal consequences is different from the "criminal law" in theory. The distinction is that provinces cannot originate a crime on the ground of protecting public welfare alone. Provincial penalties must attach to valid provincial legislation enacted pursuant to the powers enumerated in s. 92 of the B.N.A. Act. Procedurally, however, provincial offences are treated in the same way as "true" criminal offences.

Breach of municipal by-laws is punishable by a maximum fine of \$300 (s. 466(1))

Breach of provisions of the Public Health Act likewise carry penal results (s. 118)

PART IV

Economic tools

92(10) (a) *Railways*
viz. - regulation of freight rates

92(2) *Direct Taxation within the Province.*
Income tax, sales tax - have the same functions as with federal tax powers.

TABLE II-1 Cont.

	<u>FEDERAL</u>	<u>PROVINCIAL</u> (Ontario)	<u>MUNICIPAL</u> (Ontario)
<u>PART IV</u> cont.			
Economic tools	<p>91(2) <i>Regulation of Trade and Commerce</i> Includes tariff policy, import-export regulations, national subsidies; rather difficult to apply to individual industries because it may conflict with provincial jurisdiction over local matters, on property and civil rights.</p> <p>91(3) <i>The raising of money by any mode or system of taxation</i> Includes excise tax, customs tax, income tax. As a tool of environmental policy, taxation provides:</p> <ul style="list-style-type: none"> (a) a vehicle for applying incentives to persons and industries to minimize pollution; (b) a method of indirectly adding social cost of polluting industries to product prices; (c) sources of funds for public clean-up programs, and subsidies which maintain economic viability of industry despite increased costs of environmental protection measures.⁴ 	<p>92(9) <i>Sale of Licenses</i> This power is really not exclusively provincial, since the federal government may also deal with its property, or activities within its own jurisdiction, by means of licensing.</p>	<p>Rights to license certain purely local enterprises have been delegated to the municipalities by the Ontario government. These powers have negligible leverage with respect to environmental problems.</p>

4 For a more detailed discussion of the extent of taxing and spending powers, see Bora Laskin, Canadian Constitutional Law, Chapter XII at pp 665-671.

FEDERAL

PROVINCIAL
(Ontario)

MUNICIPAL
(Ontario)

PART IV Cont.

Economic Tools

Spending powers

It is generally accepted by the Canadian courts that public money validly raised may be spent in any way the government sees fit.⁵ This accounts for the power of the federal government to fund regional economic development programs despite their local nature.

PART V

General Powers

91 - Preface: *The government of Canada may make laws for the Peace, Order and Good Government of Canada, in relation to all Matters not coming within the Classes of Subjects assigned exclusively to the legislatures of the provinces.*

By virtue of 92(13) and (16), discussed above, the provincial government has wide-ranging general powers even though the Act allocates residual authority to the federal government

s.242 of the Municipal Act provides that any municipality may pass "by-laws and regulations for the health, safety, morality and welfare of the inhabitants of the municipality". On their face these words would appear to offer a scope of power as broad as the

FEDERALPROVINCIAL
(Ontario)MUNICIPAL
(Ontario)PART V Cont.

General Powers

The "POGG" power justifies federal jurisdiction:

- (a) to undertake international treaty obligations,⁶ although such obligations must also be ratified by the provinces affected where they deal with subject matters within provincial jurisdiction;
- (b) to enact health and welfare legislation;⁷
- (c) to exercise residual power over any subject matter not expressly enumerated in s.92 of the B.N.A. Act.

Conflicts develop most often over "residual powers" - those not expressly enumerated under any subject heading. The provinces claim jurisdiction if there is any local or private aspect to an activity. In order to override the private aspect, the federal government must establish that the matter constitutes:

- (a) a national emergency, or
- (b) a matter of exceptional national concern, demanding standardized control across the country.

federal "POGG" power. Judicial interpretation has not reached a definitive stage, but it seems likely that no by-law under s.242 will stand if it:

- (a) conflicts with federal legislation,
- (b) conflicts with provincial legislation and has no relation to a specific power delegated to the municipality; or
- (c) is prohibitive in nature.

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6 A-G Can. v A-G Ont., [1936] S.C.R. 461 per Duff, C.J.

7 Reference re Validity of Section 5(a) of the Dairy Industry Act, [1949] S.C.R. 1, per Estey, J.

TABLE II-1 Cont.

FEDERAL

PROVINCIAL
(Ontario)

MUNICIPAL
(Ontario)

PART V Cont.

General Powers

92 (10) (c) *Such works as, although wholly situate within the Province, are before or after their execution declared to be for the general advantage of Canada.*
The extent of this power is uncertain, as it has seldom been used independently. It is usually cited in conjunction with the "POGG" power.

The foregoing Table demonstrates how blurred in fact is the "exclusive" jurisdiction which sections 91 and 92 of the B.N.A. Act purport to convey. The situation is further complicated by the fact that a single enterprise may fall under the exclusive jurisdiction of both levels of government simultaneously. For instance, commercial fishing in Ontario has an aspect of property and civil rights for the fishermen themselves; it also fits into the larger picture of Inland Fisheries entrusted to federal power. Therefore, the two levels of government exercise concurrent powers. Even when legislation of one government does encroach upon the jurisdiction of the other, it is sometimes legitimated. This occurs when the offending section is incidental to a whole statutory scheme, and the fundamental thrust of the statute is within the rightful power of the enacting body.⁸

In two recent cases the constitutional implications of provincial legislation have been discussed at length. In March 1973, the Ontario Supreme Court overruled a County Court decision that s. 14 of the Environmental Protection Act is ultra vires the Ontario legislature.⁹ The trial court posited that pollution is of such grave national concern that it belongs under exclusive federal jurisdiction by virtue of the "POGG" powers.¹⁰ This contention was reversed on appeal; the subject matter dealt with is presently construed to be property and civil rights, and matters of a merely local and private nature.¹¹ While the Court of Appeal conceded there might be occasion for the federal government to act on its general power with respect to pollution, it strongly supported the predominant provincial right. The theory that jurisdiction over environmental issues is a residual subject matter for federal disposition was not spoken to.

8 A-G Canada v Nykorak (1962) 33 D.L.R. (2d) 373 (S.C.C.)

9 Prohibition to deposit or emit contaminants into the natural environment

10 Unreported decision of Clendenning, J: Reg. v Lake Ontario Cement Ltd.; in Provincial Court, Prince Edward County, June. 12, 1973

11 Reg. v Lake Ontario Cement Ltd.; 11 CCC (2d) 1

In June 1972, the Manitoba Queen's Bench confronted a constitutional question involving the right of a province to sue polluters outside the province for damage to commercial fisheries within its borders.¹² The court painstakingly canvassed each head of Federal and Provincial power, pertinent federal statutes, and all interpretive case law on jurisdiction over fishing and waters. It concluded that the Provincial Act was clearly legislation in respect of the property rights in fishing and that there was no actual conflict between its provision and those of the existing federal statutes. Where pollution affects fisheries, therefore, there is concurrent federal-provincial jurisdiction to deal with the cause.

Federal and provincial governments have adopted a conciliatory stance with respect to allocating powers over environmental protection. Rather than litigate the fine points of law, the federal government has deferred to provincial powers, and has adopted administrative formulae for integrating its legislative input with that of the provinces. For instance, the Canada Water Act envisions joint federal water quality management agencies, able to exercise the powers of both levels of government. The federal Fisheries Act, R.S.C. 1970, F-14, is left to the Province of Ontario to enforce.

12 Reg. v L.P.C.O. and Dryden Chemicals, (1972) 5 W.W.R. 541, a civil suit under the Fisherman's Assistance and Polluter's Liability Act, S.M. 1970, c. 32.

C. STATUTORY INSTRUMENTS

1. Introduction

There exist a host of federal and provincial statutes which have influences, direct or indirect, upon the abatement of air and water pollution from pulp and paper mills. One must not, however, isolate the secondary processing of wood products from the primary forest industry. Timber activities may alter the fundamental ecology of large areas and they have a profound effect on land as a recreational resource. Moreover, economic incentives and disincentives cannot be applied to one aspect of the wood industry without considering how they will relate to the other. To ignore the fact that the economics of logging and secondary processing of wood products are intimately bound together is to invite frustration of any statutory scheme.

The object of this section is to summarize the policy instruments affecting the Ontario wood industry, at the provincial level, and at the federal level. In some cases, they appear for their value as alternative methods of management only, not having been applied in practice (the Canada Water Act, for instance).

Note the variety of administrative approaches represented in these legislative instruments, and the multiplicity of public service and judicial bodies designated to implement them. These instruments were introduced one by one over a considerable period of time, each answering the exigencies and priorities of the day. Consequently, these Acts are lacking in policy direction and coordination. There also tends to be a diffusion of authority which impedes application of a satisfactory scheme for pollution abatement and economic incentive in the wood product industry.

An annotated list of the relevant Acts is presented on the following pages. The instruments are organized under the following functions: Regulatory Instruments for Pollution Control, Criminal Law, Regulatory Instruments for The Forest Products Industry, Taxation, Industrial and Regional Development and Research Incentives.

2. Regulatory Instruments for Pollution Control

a. ONTARIO

- i. MINISTRY OF ENVIRONMENT ACT T.S.O. 1970, c.112; am. 1971, c.63; 1972, c.1, 2.67.

This Act states that the Minister shall preside over and have charge of the Ministry (s.2(2)), and is responsible for the administration of any Act assigned to him by the Executive Council (s.4). The nature of his powers and duties will be defined by the Acts so assigned.

- ii. THE ENVIRONMENTAL PROTECTION ACT S.O. 1971, c.86; am. 1972, c.69; 1972 c.106.

This Act is a legal morass and a clear and reliable interpretation has been almost impossible to obtain. Its scheme consists of setting down some general prohibitions with respect to emission of any contaminant into any part of the natural environment, and then creating specific procedures for regulating and permitting exactly such behaviour with respect to particular types and sources of contaminants. For the pulp and paper industry, the major pollution effects are on air and water. The general prohibitions apply to both spheres.

Prohibition 5.-(1) No person shall deposit in, add to, emit or discharge into the natural environment any contaminant, and no person responsible for a source of contaminant shall permit the addition to, emission or discharge into the natural environment of any contaminant from the source of contaminant, in an amount, concentration or level in excess of that prescribed by the regulations.

Exception (2) Subsection 1 does not apply to animal wastes disposed of in accordance with normal farming practices. 1971, c.86, s.5

Prohibition 14.-(1) Notwithstanding any other provision of this Act or the regulations, no person shall deposit, add, emit or discharge a contaminant or cause or permit the deposit, addition or emission or discharge of a contaminant into the natural environment that,

- (a) causes or is likely to cause impairment of the quality of the natural environment for any use that can be made of it;*
- (b) causes or is likely to cause injury or damage to property or to plant and animal life;*
- (c) causes or is likely to cause harm or material discomfort to any person;*
- (d) adversely affects or is likely to adversely affect the health of any person;*
- (e) impairs or is likely to impair the safety of any person; or*
- (f) renders or is likely to render any property or plant or animal life unfit for use by man. 1972, c.106, s.3.*

Exception (2) Clause of a subsection 1 does not apply to animal wastes disposed of in accordance with normal farming practices. 1977, c.86, s.14(2).

- (1) The word "contaminant" is defined in general terms in the interpretation section (1)(c), and is apparently subject to specific definition by regulation (s.94(1)(a)). Regulations may also exempt whole classes of potential contaminants¹³. However, since s.14 is introduced by the phrase "notwithstanding any other provision of this Act or the regulations", and proceeds to re-assert the general prohibition, it is unclear to what extent:

13 At present the only exempted categories relating to water quality are agricultural wastes (s5(2) of Act) and substance used to remove road ice (O.Reg.505/72).

- (i) contaminants must be prescribed by regulation to qualify under the Act;
- (ii) compliance with regulation offers protection from the general prohibition to a person discharging contaminants.

Penalties for contravention of the prohibitions are a maximum of \$5,000 per day for a first offence, and \$10,000 per day for subsequent ones (s.102).

- (2) A Director may issue a Control Order (s.6) with respect to any discharge which constitutes a violation of ss.5 or 14. This order may call for cessation or regulation of discharge, the application of certain procedures, or the installation of abatement equipment by a fixed time (s.70) . The order is variable (s.72), and can be appealed (s.79). Where, in the Minister's opinion, there is immediate danger to life, health or property of people, he may issue a Stop order which operates as an immediate injunction against the discharge of the contaminant permanently or for a limited period of time (ss. 74-76). Violation of a control or stop order creates liability to the general penalty of s.102, as set out above. However, so long as the control order is complied with, the person cannot be prosecuted under the general prohibitions of ss.5 and 14 (s.102(2)).

- (3) Where a plant proposes any new facility, or alteration of an existing one, which will or may discharge effluent into the air, (not water), it must first get an approval from the Director of the Environmental Approvals Branch (s.8).¹⁴ The Director's considerations in issuing, refusing, or conditioning the approval are to be:
- (i) compliance with existing regulations
 - (ii) prevention of a hazard to personal health and safety, or to the environment for any use that can be made of it.
- (4) A polluter may voluntarily submit a program for progressive clean-up of his operations, which may be negotiated and agreed upon by the Director (s.11). Once this program approval is in force and complied with, the person is not liable to prosecution under the general prohibitory sections (s.102(2)), but may still be served a control or stop order if the Minister apprehends immediate danger to life, health, safety or property (s.12).

Control orders, stop orders and program approvals are not expressly limited to air pollution problems; however, the OWRA already provides comparable tools for the regulation of emissions into water (s.33, s.69, s.31(3)). It is probable that Water Management authorities could employ control and/or stop orders, but they are more likely to use those provided by their own Act.

14

The Ministry of the Environment was reorganized on April 1, 1974. Approvals for new industrial discharges into the air or water must be obtained from the Industrial Approvals Section of the Environmental Approvals Branch.

Regulations EPA

RRO 15 Air Pollution Control Act

- s.4 The Minister may draw up an "Air Pollution Index" and may order contributors to curtail their operations if it reaches 50 and weather is likely to sustain or increase the pollution effect for 6 hours.
- s.5 Schedule 1 sets out the standards for contaminant emissions from stationary sources, with respect to any "point of impingement". Therefore, it is not the concentration at emission, but at point of impact, that is critical.
- s.6 general prohibition against causing discomfort, loss of enjoyment or use of personal property, damage to property, damage to normal conduct of business.
- s.16 Schedule 2 - The Minister shall use the figures set out in Schedule 2 for controlling ambient air quality.

iii. ONTARIO WATER RESOURCES ACT R.S.O. 1970, c.332;
am. 1972, c.1 s.70

The Act is to be administered by the Minister of the Environment (s.2), and he may delegate any of his powers and duties under the Act to any other officers of his Ministry, subject to Cabinet approval (s.9). This automatically gives room for dispersion of authority among any number of semi-autonomous sectors of the Ministry.

"Sewage" in the Act includes, by definition, commercial and industrial wastes, and any matter or substance specified in regulations made by Cabinet under ss.62(2)(1) and (1(p)); "sewage works" means any work for transmission, treatment or disposal of sewage, except a municipal sewage plant.

The functions of the Minister under this Act are primarily to provide for the construction and maintenance of sewage and water works (ss.17(1);26); in the 1972 amendment to the Act, a blanket mandate was conferred upon the Minister, to have "the supervision of all surface waters and ground waters in Ontario" (s.31). The same amendment directs the Executive Director, Water Supply & Pollution Control, to control and regulate, all aspects of treatment and use of water for public purposes, and to make orders in that respect (s.17(16)). Clearly, then, the Minister's powers include regulation of private enterprises with respect to their effect on water quality.

The preventive measures designed under the Act are:

- (1) The Minister, with Cabinet approval, may make regulations prescribing standards of quality for sewage and industrial effluents (s.62(1)(k)), and prescribing operating standards for sewage works. Application of the regulations may be general or specific as to region, time, etc. A violation of these regulations may produce a maximum \$1,000 fine (s.62(3)).

- (2) Prior to the establishment or extension of any sewage works by any person (includes a corporation) or municipality, the proponent must get an approval from the Executive Director, Water Supply & Pollution Control.¹⁵ The Director may give the approval, refuse it or make it conditional on whatever changes in the plans he deems necessary (s.42(4)).

Presumably he can make the conditions more stringent than those set out in the general regulations of the Ministry. Failure to apply for approval makes the proponent liable to a maximum \$2,000 fine (s.42(2)); violation of a condition of approval makes him liable to a fine of up to \$500 per day that the violation continues. This power is not very helpful to control current pulping operations, since it does not apply to established works unless they are altered or expanded.

- (3) Any person who takes more than 10,000 gallons of water per day for industrial purposes, by means of an inlet or diversion work installed or altered after March 29, 1961, must first get a permit from the Executive Director, Water Resources (s.37(3)). The Executive Director may then refuse the permit, or impose whatever conditions he sees fit, (s.37(6)) and may later alter or cancel the permit. Failure to apply, or breach of conditions, gives rise to a prosecution with maximum fine possible of \$200 per day the contravention continues (s.37(8)). The Minister may also make regulations of general application, with Cabinet approval, to control the use of water from any particular source of supply (s.62(1)(v)). Again, the permit system fails to affect facilities for industrial water intake

¹⁵ Except for those exempted by s.42(6), or by regulation under s.62(1)(W). At present these general exemptions include:
s.42(6)(a) a sewage work where effluent is not to be discharged directly or indirectly into a watercourse, or conduit which connects to a watercourse.

RRO 645 The Owner of a land-locked water body may discharge substances otherwise prohibited,

established before 1961 except insofar as they may be altered or expanded, and is therefore of little use to regulate pulp and paper mills.

- (4) There is a general power in the Executive Director, Water Supply and Pollution Control, to order an industrial or commercial enterprise to install facilities for treatment and disposal of sewage if he considers the current provisions inadequate (s.69(1)). Failure to comply gives rise to a possible maximum fine of \$200 per day. This power is not related to the length of time the process has been in use.
- (5) The Minister may prescribe standards of quality for potable and other water supplies, receiving streams and watercourses (s.62(1)(k)). However, the scheme of the Act with respect to controlling emission of pollutants turns on a general definition of polluting materials: the material will be deemed to impair the water if it causes or may cause injury to any person or living thing through consumption of the water itself, or any plant or other living thing so contaminated. (s.30). Any person or municipality who discharges or permits the discharge of such a substance will be deemed to have impaired the water, and is liable to prosecution and a maximum fine of \$5,000 per day the offence continues, for a first conviction, and a maximum of \$10,000 per day for subsequent offences.

This definition of deemed impairment does not apply to discharges regulated directly by an order of the Minister under s.33(1). Nor does it apply to any sewage work, public or private, constructed and operated in accordance with the approval of the Minister. These two classes of exceptions remove such persons from the enforcement scheme of ss.30,31 and 32, and make them liable to prosecution only for violation of the terms of the particular order or approval controlling their operations.

- (6) The Minister has general powers to restrain an offender from continuing to commit any of the offences created in the Act, as well as the right to prosecute (s.74).
- (7) No order or direction of the Minister can take effect until any appeal has been dealt with, except when it is an emergency order.

Although the Act provides that, at the Minister's discretion, the government may install the requisite treatment facilities itself at the expense of a person who defaults on an order (s.73), there is no provision in the Act for loans or cost-sharing arrangements with private industry to install abatement equipment. Municipalities, on the other hand, may apply "for the provision of and operation by the Minister of water works or sewage works" (ss.52-61).

The right of appeal is an important advantage to polluters who may continue their operations until the courts make a decision. Prosecutions and appeals may take over a year to be disposed of.

- iv. PUBLIC HEALTH ACT R.S.O. 1970, c.145 am. 1972, c.1 s.77; 1972, c.35; 1972, c.92 supp.

The Act states that the "Minister is responsible for the administration of this Act and others assigned to him". Two of his duties are to advise the government on the health of the people of Ontario, and generally to "oversee and promote the health and physical and mental well-being of the people of Ontario" (s.6(1)). No express words indicate that his attention is directed by the legislature to taking any positive action with respect to preventing indirect environmental health hazards.

- v. PUBLIC HEALTH ACT R.S.O. 1970, c.377; am. 1971, c.95; 1972, c.80

The Ministry of Health is given both a power and a duty *to determine whether the existing condition of any premises or of any street or public place, or the method of manufacture or business process, or the disposal of sewage, trade or other waste, garbage, or excrementious matter is a nuisance or injurious to health*" (s.4(d)).

In the exercise of these powers and duties, the Ministry may order structural alterations in offending premises (which includes any land or building, public or private, and any stream or lake (s.1(s))), or it can make any order considered necessary for public health (s.4(g)).

The statutory definition of a nuisance is "any condition ... that is or may become injurious to health" (s.86(g)).

The Act gives authority to the local Board of Health to order the person responsible for the nuisance to abate it, or to cause it to be abated of the Board's own initiative (s.92). This is not just a discretionary power, but a duty triggered by any resident householder who submits a written complaint substantiated by investigation (s.28).

The local board may turn the issue over to the Minister if "serious interference with a local trade or industry" is at issue. If the Minister thinks the problem sufficiently grave, he may apply to the Supreme Court for an injunction to restrain the offending operations until the nuisance has been abated to the satisfaction of the Minister (s.94).

This Act has the appearance of creating considerable conflict between the public health authorities and decisions taken by the Ministry of Natural Resources and the Ministry of the Environment with respect to pulp and paper operations. It is likely that revisions of the statute pending for the spring session of the Legislature will more clearly allocate powers and responsibilities by substantially diminishing those of the public health authorities. At present, the Ministry of Health is avoiding conflicts by voluntarily deferring to the opinion of the Ministry of the Environment with respect to questions of shared jurisdiction.

There are no regulations relating to industrial effluents.

vi. ACT TO ESTABLISH THE MINISTRY OF NATURAL RESOURCES
S.O. 1972, c.4

Lands & Forests and Mines & Northern Affairs were amalgamated, consolidating the administration of all the statutes which had previously been the responsibilities of two ministers. The Act makes no other specific provisions but to state "the minister shall preside over - have charge of the Ministry" (s.4).

vii. LAKES AND RIVERS IMPROVEMENT ACT R.S.O. 1970, c.233;
am. 1971, c.50 s.50

The bulk of the Act provides for regulation of "the safe and orderly floating of timber down lakes and rivers". Its concern is preventing obstructions to such floatation, either by careless logging practices, dams or other works.

The Act also proclaims in its recent amendment, the following objectives: 1971 c.50 s.50(1)

1a. The purpose of this Act is to provide for the use of waters of the lakes and rivers of Ontario and to regulate improvements in them, and to provide for:

- (a) the preservation and equitable exercise of public rights in or over such waters;*
- (b) the protection of the interests of the riparian owners;*
- (c) the use, management and perpetuation of the fish, wildlife, and other natural resources dependent on such waters;*
- (d) the preservation of the natural amenities of such waters and on the shores and banks thereof; and*
- (e) ensuring the suitability of the location and nature of improvements in such waters, including their efficient and safe maintenance and operation and having regard to matters referred to in clauses a,b, c and d, their operation in a reasonable manner.*

Sections 34 and 36 specify the procedure which is set up to achieve these general purposes.

34 (1) *Where any tree, part of a tree, refuse, substance or matter has been thrown or deposited in a lake or river or on the shores or banks thereof in such a manner as, in the opinion of the Minister, impairs the natural beauty of the lake or river, the Minister may order the committer of such act to take such steps within the time specified in the order as are necessary to remove the tree, part of a tree, refuse, substance of matter from the lake or river or from the shore or banks thereof.*

(2) *Every person who fails to comply with an order under subsection 1 is guilty of an offence and on summary conviction is liable to a fine of not more than \$50 for each day that he does not comply with the order. (1970 c.233 as amended by 1971, c.50, S.5(20)).*

It is to be noted that s.34 represents the only occasion in Ontario statute law in which impairment of beauty alone activates a power to prohibit.

36 (1) *No person shall throw, deposit or discharge or permit the throwing, depositing or discharging of, any refuse, sawdust, chemical, substance or matter from any mill into a lake or river, or on the shores of banks thereof.*

- (2) *Every person who contravenes subsection 1 is guilty of an offence and on summary conviction is liable to a fine of not less than \$200.*
- (3) *Where the Minister finds that any refuse, sawdust, chemical, substance or matter from a mill is being thrown, deposited or discharged into a lake or river or on the shores or banks thereof, the Minister may order the owner or occupier of the mill to cause such throwing, depositing or discharging to cease and may in addition order, where in his opinion it is practicable to do so, that such owner or occupier take such steps within the time specified in the order as may be necessary to remove the refuse, sawdust, chemical, substance or matter from the lake or river or from the shores or banks thereof.*
- (4) *Every owner or occupier who fails to comply with an order under subsection 3 is guilty of an offence and on summary conviction is liable to a fine of not more than \$50 for each day that he does not comply with the order. (RSO 1970, c.233 as amended by 1971, c.50, s.5(21)).*

A mill, by definition, includes a sawmill, pulp mill or pulp and paper mill. The Minister may then levy \$50 a day fines for infractions. A private citizen, basing a civil suit on his riparian rights, is not disentitled to his damages. However, the court is instructed that it may refuse the traditional common law injunctive remedy if the refusal appears proper and expedient in

view of the importance of the mill to the locality, and the benefits derived by the locality, directly or indirectly from its operation. As a substitute for the injunction the court may award damages, periodically to the injured party. The court may also present a clean-up order to the mill. This provision in effect passes the job of making political trade-offs over to the court and provides statutory directive for dealing with thorny conflicts of interest as exemplified by the KVP case (McKie v The K.V.P. Co. (1948) O.R. 398).

The Act also provides that the holder of an "occupied water privilege" (which includes an operating mill, or one under construction) may apply to a judge of the County or District court for an order empowering him to take steps which might have profound environmental effects. These include damming or diverting a water-course, or building any "raceway or erection or other work that he requires in connection with the improvement and use of the privilege (s.90). Although the judge is vaguely instructed to consider "the public interest" in making his decision, no criteria respecting impact on the environment are specified. There are no regulations under the Act.

viii. PUBLIC LANDS ACT R.S.O. 1970, c.380; am. 1971, c.46; 1972, c.4 s.19; 1972, c.29

The Act states that the Minister of Natural Resources shall have charge of the management, sale and disposition of the public lands and forests (s.2), including all Crown lands in right of Ontario (s.1(d)). The broad powers and general language of the Act could apply to regulation of forestry uses as well as many others; in fact, the regulations deal only with sales and leases of summer cottage properties and hydro rights-of-way. Forestry uses of Crown land are regulated through the Crown Timber Act.

One recent amendment to the Act prohibits the throwing or deposit of "any material substance or thing upon public lands" without the Minister's consent (S.O. 1971, c.46, s.2). The object of the prohibition is probably to prevent unauthorized refuse dumps; the language is broad enough, however, to cover the deposit of wastes from a pulp mill on public lands.

b. CANADA

i. FISHERIES ACT R.S.C. 1970, F-14; am.c.17 (1st Supp;
c.14 (2nd Supp.))

The Fisheries Act is a perfect vehicle for prosecuting logging and mill polluters, and is applicable to any waters in Ontario sustaining fish life. (Fisheries are within federal jurisdiction by virtue of s.91(12) of the BNA Act). Section 33 specifies those substances and materials which may not be deposited into any water frequented by fish.

- 33 (1) *No one shall throw overboard ballast, coal, ashes, stones, or other prejudicial or deleterious substances in any river, harbour or roadstead, or in any water where fishing is carried on, or leave or deposit or cause to be thrown, left or deposited, upon the shore, beach or bank of any water or upon the beach between high and low water mark, remains or offal of fish, or of marine animals, or leave decayed or decaying fish in any net or other fishing apparatus, such remains or offal may be buried ashore, above high water mark,*
- (2) *No person shall cause or knowingly permit to pass into, or put or knowingly permit to be put, lime, chemical, dead or decaying fish or remnants thereof, mill rubbish or sawdust or any other deleterious substance or thing, whether the same is of a like character to the substances named in this section or not, in any water frequented by fish, or that flows into such water, nor on ice over either such waters.*
- (3) *No person engaged in logging, lumbering, land clearing or other operations, shall put or knowingly permit to be put, any slash stumps or other debris into any water frequented by fish or that flows into such water or on the ice over either such water, or at a place from which it is likely to be carried into either such water.*

The prohibition is qualified by granting immunity to discharges which comply with regulations set out in this, or any other Act of the Federal government. A deleterious substance is defined either by regulation (ss.33(1)(12) , 33(4)) or in terms of its harmful effect on fish in the water and/or humans who consume the fish (s.33(1)(11)). There are also preventive powers. When construction, alteration or expansion of any facilities is being planned, the Minister may interfere to prohibit it or require modification, if he apprehends the likelihood of deposit of a deleterious substance (s.33(3)). The Minister must take the initiative to apply this prerogative; there is no automatic approvals mechanism.

The remedies available parallel those under the CWA: a \$5,000/day maximum fine, (s.33(1)(5)), and/or injunction of the offending activity (s.33(1)(7),(9)). The Minister also has power to direct repair or remedy of the condition, and mitigation of the damage, and to charge such costs to the offender; this is condition on finding a violation (s.33(1)(10)).

Private rights are not encroached upon by the Act and civil remedies are preserved notwithstanding the criminal liability for an offence (s.33(1)(10)). Moreover, there is an incentive to private prosecution built into the regulations. A private prosecutor will receive half the fine and half the proceeds from sale of seized equipment, if his charge succeeds. This provision dates back to December 1947, but was reiterated in June at 1973 (1965 Consolidation, C-55, s.1. 46/73).

In the 1970's the government set about appending two sets of regulations dealing expressly with pulp and paper operations:

- (1) The Chlor-Alkali Mercury Regulations (S.O.R. 92/72
- (2) The Pulp and Paper Effluent Regulations (S.O.R. 578/72

These regulations are reprinted in Appendix C.

Technically and in application, these regulations represent a compromise position. Their concentration limits are based on information provided by the industry itself. The Effluent regulations do not apply to any mill built before 1971, except with respect to alterations or expansions carried out after that year. (Older mills could still be prosecuted under the general prohibition in (s.33(1)(5)).

Federal regulations, therefore, refer essentially to new mills. The drafting of regulations and the enforcement of environmental controls on existing mills is left almost entirely to the provincial authorities. While in some cases, the provincial regulations are claimed to exceed those promulgated by the Federal government, Federal regulations provide a minimum environmental standard to which all provinces are subject. It is not clear, however, how vigorously these regulations are enforced by either the Federal or Provincial authorities. As far as is known, Ontario has never yet employed Federal legislation.

ii. CANADA WATER ACT R.S.C. 1970 (1st Supp.), c.5

The Canada Water Act represents a scheme of water quality management quite different from that of Ontario. In particular:

- (1) It sets water quality control in a framework of drainage basin planning;
- (2) it is based on effluent discharge fees, supported by the conventional minimum-standard-regulations, injunctive, and penalty provisions.

The plan of the Act is as follows:

- (1) Waste is defined as *any substance that if added to any waters, would degrade or alter or form part of a process of degradation or alteration of the quality of those waters to an extent that is detrimental to their use by man or by any animal, fish or plant that is useful to man, and includes*

any water that contains a substance in such a quantity or concentration, or that has been so treated, processed or changed, by heat or other means, from a natural state that it would, if added to any waters, degrade or alter or form part of a process of degradation or alteration of the quality of those waters to an extent that is detrimental to their use by man or by any animal, fish or plant that is useful to man; (2)(1) or it may be specifically defined by regulation (s.16(1)).

- (2) The appropriate authorities set up a Corporation without share capital (or name an existing one) to plan, initiate and carry out water quality management programs (ss.9;11).¹⁶
- (3) The Corporations make studies, consult the public, and arrive at recommendations as to desirable quality standards, and the appropriate treatment facilities/waste discharge regulations for achieving them. They also make recommendations as to appropriate effluent discharge fees to be paid by persons for the deposit of waste in those waters and the time or times at which and the manner in which such fees should be paid. 13(1)(c) (iv).
- (4) The object of the Act is to arrive at a scheme of discharge fees which will permit the corporation to be financially self-sustaining after an initial period of time.

It visualizes a closed system whereby trade-offs between desired uses are determined before regulations are cast, by an independent, regionally-oriented agency. Then the costs of achieving and

¹⁶ Where there is clear federal jurisdiction, the Minister of Environment Canada would have the authority; where jurisdiction overlaps with that of the province, a federal-provincial joint agency must be instituted.

maintaining those standards are borne by the polluters in proportion to the degree to which their activities would cause deviation from the desirable standard.

- (5) The enforcement system includes a prohibition to deposit waste of any type into waters controlled by the agency, except under the conditions prescribed by the agency and with payment of the appropriate fee (s.8). Violation incurs a maximum \$5,000/day penalty. The court has a discretion in any prosecution to order the offender to cease any activity which is likely to produce renewed violation (s.30).

This is truly an exemplary piece of legislation in many respects, but its effectiveness is gravely endangered by constitutional frailties. If the federal government takes vigorous unilateral action, it is likely to become embroiled in jurisdictional disputes with the provinces. The damage to its credibility on environmental issues would be immense. Therefore, it has only implemented the Act where it can persuade the province to participate jointly, and no such program has yet approached the discharge-fee stage.

Among the positive qualities of this statute are:

- clear and explicit drafting, lacking the "legalisms" that unnecessarily obscure the real meaning of legislation to the layman;
- express provision for public participation in the planning process: mandatory public hearings (s.13 (1)), publication of the plan prior to its approval (s.13(2));
- express right of private prosecution under the Act for anyone resident or carrying on business in the territorial jurisdiction of the court where information is laid;

- express preservation of civil remedies for any act or omission that is an offence under the Act.

No regulations have been passed to define "waste", or to set a scheme of discharge fees.

- iii. HARBOUR COMMISSIONS ACT R.S.C. 1970, H-1
- iv. NATIONAL HARBOURS BOARD ACT R.S.C. 1970, N-8, c.16 (1st Supp.)

Agencies endowed with power to regulate a harbour also have some jurisdiction over other undertakings in that harbour. In some circumstances this may include activities of a pulp and paper mill. Although there are no National Harbours in Ontario, three Harbour Commissions have been instituted in this province. They are at the Lakehead, Windsor, and Oshawa. Each Commission has general powers under the Act, especially to "regulate the use and control of all land, buildings and other property within the limits of the harbour"(s.9). In addition, each Commission operates within an exhaustive set of by-laws which vary from one to the other. At the Lakehead, for instance, no building or plant may be erected in the harbour or encumbering the shore without permission of the Commissioner (ss.31,32). Likewise, the Commission must approve the discharge into the harbour of any material which might cause a nuisance or endanger persons or property (s.32). Penalty for violation is a maximum fine of \$500 or 30 days imprisonment.

v. NAVIGABLE WATERS PROTECTION ACT R.S.C. 1970, N-19

This Act prohibits any person from depositing or permitting the deposit of "sawdust, edgings, bark or like rubbish" in a navigable river if it is likely to interfere with navigation.⁽¹⁹⁾ The penalty is a maximum \$5,000 fine (s.25). Cabinet may, however, exempt certain waters from the protection of ss.19 and 20 by proclamation (s.21). As of December 31, 1973, eight such exemptions were in existence, representing political assent to the applications of mining companies to discharge tailings into the beds of lakes and rivers.

The Act affords poor protection from pulp and paper mill activities, since navigation is not a significant factor in most rivers receiving the discharges. More important, the government seems to have established a policy of suspending the overall prohibition where primary resource industries are concerned.

vi. INTERNATIONAL RIVER IMPROVEMENTS ACT R.S.C. 1970, 1-22, am. c.14 (2nd Supp.)

INTERNATIONAL BOUNDARY WATERS TREATY, 1909

This Act is aimed primarily at dams which interrupt or alter the flow of a river across a national boundary. Technically, however, it includes any "other work", the purpose or effect of which is to alter the flow of the river or affect its potential use outside Canada. It could be argued that massive pollution answers these criteria for triggering operation of the Act. If the International River Improvements Act were enacted to facilitate observation of the International Boundary Waters Treaty, such a construction would not be a strain on the words of the Act.

Article IV of the Treaty states that "boundary waters shall not be polluted on either side to the injury of health or property on the other".

An international river improvement must be licensed; failure to obtain a licence incurs penalties of \$500 to \$5,000, imprisonment up to 5 years, and forfeiture of the offending work.

vii. MIGRATORY BIRDS CONVENTION ACT R.S.C. 1970, 17-12
am. c.14 (2nd Supp.)

This Act may relate to both forestry and pulping activities because of the power it creates in the Cabinet to make any regulations "deemed expedient" to protect migratory birds. Protection includes control and management of their nesting areas (s.4(2)(f)). It is unlikely that any broad controls would be passed under this heading; however, the Act might be used to prevent incursion of new pulping or forestry activities upon major, established nesting grounds.

viii. CLEAN AIR ACT S.C. 1970-71-72, c.47

Air pollution like water pollution, results from activities over which the federal government has no clear-cut jurisdiction, and possibly no jurisdiction at all. Therefore, this Act had to be drafted in such equivocal form and language that its applicability is a matter of conjecture, depending on the facts of each separate situation. Where a work falls into one of the categories entrusted exclusively to the federal government - such as railways - the government may enforce a code of national emission standards. Pulp and paper mills clearly do not fall into such a class. Therefore, to exercise any authority over their behaviour the government must establish that they:

- a) constitute a significant danger to the health of persons,
- b) threaten to violate an international treaty,
- c) constitute a national emergency because of extreme hazardousness (s.7).

Then it may apply the national emission standards. Penalty for violations in these circumstances is a maximum \$200,000 fine.

In the absence of such a situation, the federal government must rely on:

- (1) persuasion, by means of national emission guidelines (s.8); or
- (2) voluntary adoption of national ambient air quality objectives by a province (s.20).

Once a province has adopted the ambient air objectives, the federal cabinet may set specific emission standards for individual works, consonant with attaining those objectives. Enforcement of these standards is left up to the individual province.

No national emission standards have been established as yet. The government did announce a set of objectives for sulphur dioxide, particulate matter, carbon monoxide and total oxidants (Jan. 3, 1973); however, these objectives have absolutely no binding force. Moreover, they set only "acceptable" and "desirable" standards. There are no figures to designate the "tolerable" level, which is defined as a level indicating "the onset of imminent danger requiring immediate abatement action". Even the guidelines, then, avoid the issue of demanding immediate action.

3. Criminal Law

a. CANADA

i. CRIMINAL CODE R.S.C. 1970, c.34;

Nuisance was originally an offence against the public welfare, and fell within the category of criminal common law. When the law was codified, the offence of common nuisance was retained in what is now s.176 of the Code. A common nuisance is defined for criminal purposes as the doing of an unlawful act, or failure to discharge a legal duty. Such an act or omission must cause danger to the lives, safety, health, property or comfort of the public, or obstruct the public from enjoyment of any right held in common.

Common nuisance in criminal law has, therefore, much the same dimensions as public nuisance in civil law. It would only be available against behaviour which might damage interests of a broad class of people. Nevertheless, if the court can find the acts of the accused were likely to cause annoyance to the whole public, there may be conviction even though only one person has actually been damaged (Raymond v. Cook, (1958) 1 WLR 1098). The nuisance need not be grave to be an offence.

The major obstacle to using the Code for pollution problems is the necessity to convince the police to lay an information, or a magistrate to accept one. The general attitude is that pollution is a matter for the appropriate regulatory authorities. It appears highly unlikely, on a reading of the procedure for indictable offences, that a private person could conduct the prosecution at trial without approval from the Attorney-General's office or a court.¹⁷

17 See Fred Kaufman, "The Role of the Private Prosecutor", (1961) Feb., McGill Law Journal, p. 102

Finally, a conviction cannot give rise to any remedial order, but only to a term of imprisonment, (maximum 2 years), or a fine in lieu of imprisonment. The amount of the fine is at the discretion of the sentencing court (s.646, 647).

Two other provisions of the Code, mischief (s.387) and criminal negligence (s.202,203,204) are directly applicable to activities which cause bodily harm, property destruction or interference with lawful enjoyment of property. They have never been applied to polluters. Criminal law has historically been a retributive weapon of society, and its sanction was not considered appropriate for activities which in an industrial economy were visualized as beneficial, with only peripheral adverse effects. Perhaps a fresh analysis of the relative weights of benefit and damage is called for, in light of modern awareness of potential dangers in particular effluents such as mercury. The concept of duty to the public may well be considerably upgraded, resulting in broader grounds for an accusation of criminal negligence.

4. Regulatory Instruments for Forestry Activities

a. ONTARIO

i. CROWN TIMBER ACT R.S.O. 1970, c.102; am. 1971, c.23; 1972, c.4 s.16; 1972, c.26

This statute is concerned with any timber on public lands, including public parks, which are subject to the management of the Minister of Natural Resources. The Act gives the Minister the authority to regulate certain aspects of forestry operations even after a lease, licence or permit has been issued (s.1(m)). The Act sets out the conditions under which the Minister may dispose of Crown timber.

The Minister may sell a licence to cut Crown timber by tender, at his sole discretion (s.2(1)); or he may grant licences to cut (with approval of the Executive Council) under whatever pricing scheme he deems proper (s.3(1)). In addition, with approval of the Executive Council, he may designate public lands, or lands in which the Crown has an interest, as a Crown management unit, and enter into an agreement with any person to provide timber to him from these lands (s.4).

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Any licence is to have strict territorial boundaries (s.6), and specify the species to be cut (s.8). One critical condition of issue of the licence is that all timber cut thereunder be manufactured into lumber products or pulp in Canada. The Executive Council may, from time to time, permit by proclamation the export of raw timber of specified classes (s.16).

Licences are subject to considerable variance during their currency, either for the benefit of the licensee, or to limit his rights (ss.3(3);26). Cabinet has power to alter the terms of the licence, regulations notwithstanding, if this is deemed necessary in view of the "general business requirements of the licensee". The Minister may place additional restrictions on the licence for the purposes of "forest management, watershed protection, preservation of beauty of the landscape".

A licence may be assigned if the Minister agrees in writing, and the transfer fee is paid.

Cutting itself must be conducted in accordance with a general management plan (s.24), and with an annual cutting plan submitted for Ministerial approval (s.25). Minimum size may be set by regulation for cutting any species (s.51(h)). Re-generation agreements are optional (s.25(4)).

The Minister is authorized to issue a manual prescribing the standards; method and form for preparing the general management and annual cutting plans (s.31); it is not enacted as a regulation.

The Crown in return levies several "Crown charges". A forest protection charge currently stands at \$26.50/year per square mile of all productive lands in the licence. The management charge is \$2 per square mile of productive land (RRO 1970, Reg. 159, ss.3,4). The stumpage charge comprises the minimum Crown dues (which are last set by O. Reg.377/71), plus whatever additional charges were added in the course of setting the price for a particular cutting licence (defined s.1(o) of the Acts s.1(1) of Reg.159, RRO 1970).

This Act also deals with licensing mills, defined as "a plant in which logs or wood - bolts are initially processed and includes a saw mill and pulp mill" (s.1(h)).

- s.45 (1) no person shall construct, reconstruct or operate a mill, or increase the productive capacity of a mill, or convert an existing mill to a mill of another type, without a licence from the Minister".

Sections 16-20 of Reg. 159, RRO 1970 set out the procedure and forms for applying for a mill licence. There is no statutory obligation imposed to consider environmental damage in issuing the licence; nor does it provide for imposition of conditions on the grant of a licence.

- ii. FORESTRY ACT R.S.O. 1970, c.181; am. 1971, c.17;
1971, c.50 s.42

This statute provides a vehicle for the Ministry of Natural Resources to enter into an agreement with owners of private land to manage it for forestry purposes (s.2), or to declare it a private forest reserve outright (s.5). Forestry purposes include the production of wood and wood products, provision of proper environmental conditions for wildlife, protection against floods, erosion, recreation, protection of water supplies.

The Act also allows the Minister, subject to regulations, to provide nursery stock to any person having any right, title, interest or equity in land (s.7). The actual regulations, however, provide only for supply of nursery stock to owners of private land, not including Crown Land. This excludes lessees of Crown timber. (RRO 1970, 355).

- iii. WOODLANDS IMPROVEMENT ACT R.S.O. 1970, c.502

The Ministry of Natural Resources may enter into an agreement with the "owners of land that are suitable for forestry purposes" to plant nursery stock or otherwise improve the woodlands existing. The owner may then only cut as provided for in the agreement. Regulations identify the private woodland management areas within which landowners are eligible to enter into such agreements with the Minister.

- iv. PROVINCIAL PARKS ACT R.S.O. 1970, c.371, am. 1971, c.16;
1972, c.1 s.87; 1972, c.27

This Act is also administered by the Ministry of Natural Resources. The fundamental nature of each park may be set out by the Executive Council: recreational, primitive, or whatever (s.5). These classifications demonstrate whether forestry is to be permitted at all within the park, and to what extent. The Minister is

thereafter responsible for managing the park, a discretion which includes power to zone particular areas for particular uses (s.7(2)), including lumbering use.

The Executive Council may also make general regulations with regard to regulating the use of lands in provincial parks, and prohibiting or regulating occupation of such lands, including timber leases (19(1)(c,d)).

v. WILDERNESS AREAS ACT R.S.O. 1970, c.498

The Ministry of Natural Resources may set aside any public lands "for the preservation of the area as nearly as may be in its natural state" but such a designation in no way limits or affects the "development or utilization of the natural resources in any wild area that is more than 640 acres in size" (s.3).

The Minister is empowered to "control and manage" these wilderness areas (s.5). There is also power vested in the Executive Council to make regulations, either general or applicable to one specific area, prohibiting or controlling the uses of such lands (s.7). Unfortunately, the regulations simply adopt the general wording of s.3 of the Act and refrain from committing themselves to express prohibition or acceptance of logging or pulping uses.

vi. SETTLERS' PULPWOOD PROTECTION ACT R.S.O. 1970 c. 432

Where a bona fide settler is occupying, clearing or cultivating lands under the Public Land Act and is selling pulpwood to any company, the Ministry of Natural Resources may step in to regulate such sale with regard to quantity, quality and price.

b. CANADA

i. NATIONAL PARKS ACT R.S.C. 1970, N-13

The occupation and use of national parks land is prohibited except within the authority of the regulations (s.6(1)). There is no express power in the Act to issue timber leases; however, forestry is subsumed under the general heading of "management" of the park.

Regulations for cutting timber were first instituted in 1956 (SOR 56/166), and leases amended in 1965. There is no obligation on the licence to re-plant the area he has "cultivated". Any "environmental" controls will take the form of conditions to the lease, imposed at the discretion of the Minister.

ii. TIMBER MARKETING ACT R.S.C. 1970, T-8

This statute does not present a scheme for marketing, it simply institutes a system of registering distinctive marks for each logging company's produce. The object is just to distinguish one company's property from that of the other.

5. Taxation Instruments

a. ONTARIO

- i. INCOME TAX ACT R.S.O. 1970, c.217; am. 1971, c.22; 1971 (2d), c.1; 1972, c.1 s.106; 1971 c.100; 1971 c.146

Applies only to individuals, a term which would include members of an unincorporated firm (and hence the profits which flowed through the firm) but not corporations. There are no special allowances for woodsmen or those making their living through the forestry business. Since the tax is levied in terms of a percentage of federal taxes payable, the significant exempting provisions are found in the Canada Income Tax Act.

- ii. RETAIL SALES TAX ACT R.S.O. 1970, c.415; am. 1972, c.21

2(1) *"Every purchaser of tangible personal property except the classes thereof referred to in ss.2, shall pay to Her Majesty in right of Ontario a tax in respect of the consumption or use thereof"*
..... A "purchaser" includes a corporate entity, and "use" is defined as the exercise of any right or power over the property incidental to the ownership of the property. While pollution abatement equipment will be subject to the tax, the actual logs are probably exempt by virtue of either s.5(1), 39 or .22.

iii. POLLUTION ABATEMENT INCENTIVE ACT R.S.O. 1970, c.352;
am 1972, c.1 s.72

The Act is actually entrusted to the Minister of Energy, but he may delegate any of his powers or duties under it to any officer or officers of the Ministry of the Environment. The scheme of the Act is to permit any owner of a source of pollution except a motor vehicle..."(s.2(c)) to recoup the full amount of the Retail Sales Tax paid for pollution abatement equipment which had been installed and made operational after the coming into force of this Act. Or, if an entire process has been changed and has resulted in lessening pollution discharge, the Minister may rebate the value of the tax paid on new equipment installed as part of the change. A pulp and paper manufacturer would qualify for the rebate as a "person engaged in the manufacturing or processing of products" (s.2(b)), or as "any owner of a source of pollution" (s.2(c)).

The Executive Council is empowered to make regulations setting classes of equipment which are or are not eligible for grant rebates, but to date none have been established. The Ministry of the Environment currently processes the rebate applications and the appropriate Branches in that Ministry decide what proportion of the equipment is actually devoted to pollution control.

iv. ASSESSMENT ACT R.S.O. 1970, c.32

By s.39 (S.O. 1972, c.29, s.6) the Minister of Revenue is to report any leases of public lands to the appropriate municipal assessment officer. However, the interest of timber lessee or licensee under the Crown Timber Act is exempt from assessment and taxation being "lands or property belonging to Canada or any Province" (s.3(1)). This exemption was expressly extended to timber licensees by virtue of s.26(4).

v. PROVINCIAL LAND TAX ACT R.S.O. 1970, s.370; am. 1971, c.50 s.70; 1972, c.1 s.91

The Minister of Revenue administers this Act, which imposes tax on all land situate in territory without municipal organization, with specific exemptions (s.3(1)).¹⁸ Land by definition includes all trees and underbrush growing on land (s.1(d)(ii)). However, one of the specific exemptions is the right of a licensee under the Crown Timber Act to cut timber under his licence (s.3(1) 13)). Similarly, land held in trust for an Indian tribe is exempted (s.3(1)2). The Executive Council may create additional exemptions by regulation but has not so far done so in respect of forest or pulp and paper industries. The land is to be assessed at open market value (RRO 1970, 694) (s.4(1)). Although there is provision for a varying scale of rates, the current regulation applies a flat 1 1/2% of assessed value.

vi. THE LOGGING TAX ACT R.S.O. 1970, c.258; rep. 1972, c.19 s.1

Was repealed by 1972 c.19, effective with respect to tax years after March 31, 1972.

The tax rate was set at 10% of net income derived from logging operations, in excess of \$10,000. All logging operations conducted by the same tax-payer were to be treated as one (s.2(4)), and net incomes of affiliated tax-payers were combined for tax purposes. (s.2(5)). "Logging operations" refer to practically any business transaction involving logs which might yield a profit. It did not include secondary processing.

18 Up to 1971, this Act was under Lands & Forests administration.

b. CANADA

- i. EXCISE TAX ACT R.S.C. 1970 E-13, am. 1970-71-72, c.62; c.10 (2nd Supp.)

A 12% sales tax is levied on the sale price of all goods produced or manufactured in Canada, or imported into Canada (s.27). However, among the classes of goods exempted from the tax are several which reflect incentives to the forest industry, viz. logging wagons, tractors, and all machinery for exclusive use in logging operations (Schedule III, Part XIII, s.1).

Also exempted is any equipment sold or imported to abate dust and fumes (Part XIII, s.1(b)).

- ii. CUSTOMS ACT R.S.C. 1970 C-40 am. c.10 (2nd Supp.); c.32 (2nd Supp.); 1972, c.17 s.2

This Act simply sets up the general proposition that all goods are subject to duty on entry into Canada.

- iii. CUSTOMS TARIFF ACT R.S.C. 1970 C-41, am. 1970-71-72, c.65

This Act sets out the specific rates of duty to be applied to individual classes of products. Besides the fixed rates, there is provision to levy a surtax where imports are damaging a Canadian industry. (s.8(2)).¹⁹

- iv. EXPORT ACT E-16

Cabinet may, by proclamation, charge an export duty on certain logs and pulpwood to any country which puts a duty on certain products exported to it from Canada. These products are enumerated in the Schedule to the Act, and consist mainly of forest products themselves (s.2). In effect, the object of the Act is to facilitate imposition or removal of trade barriers on a reciprocal basis.

In addition, the Cabinet may prohibit export of specified types of unprocessed pulpwood by regulation, but such restriction must be approved by both Houses of Parliament (s.5(1)(b)).

¹⁹ See Schedule A, Group V - pulp, paper & books - newsprint, Group IX - wood and manufacturers thereof for a Comparison of Canadian, U.S. and European Tariffs on pulp and paper products.

6. Industrial and Regional Development Instruments

a. ONTARIO

i. THE MINISTRY OF TREASURY, ECONOMICS & INTERGOVERNMENTAL AFFAIRS ACT, S.O. 1972, c.3

The Act consolidates the two former ministries of Treasury & Economics, and Municipal Affairs. Any statute formerly administered by either is deemed transferred to the administration of Treasury, Economics & Intergovernmental Affairs. The Minister of TEIGA is also the Treasurer of Ontario.

S4 (1) The Treasurer shall direct and control the Ministry of Treasury, Economics and Intergovernmental Affairs, recommend to the Executive Council financial, economic, accounting and taxation policy, advise on intergovernmental affairs, supervise, direct and control all financial, economic, statistical and accounting functions and manage the Consolidated Revenue Fund for all public money.

The Consolidated Revenue Fund is the sum total of public monies on deposit in the name of the Crown in right of Ontario (1(6)). Public monies refer to all monies belonging to Ontario received by the Treasurer or any other public officer and include revenues, loans and provincial debt, and special funds.

Clearly, this Ministry has an influence on the economic policy instruments relevant to the commercial welfare of the pulp and paper industry.

ii. NORTHERN ONTARIO DEVELOPMENT CORPORATION ACT R.S.O. 1970, c.299; am.1971, c.87; 1972, c.1 s.80; 1972, c.69

The objects of the corporation are to encourage and assist in the diversification of industry in Northern Ontario (defined in the Act as the Districts of Algoma, Cochrane, Manitoulin, Nipissing, Sudbury, Timiskaming, Kenora, Rainy River, Thunder Bay, and any other designated by the Executive Council). Candidates include established industries looking to expand or diversify; assistance may take the form of loans, guarantees, equity purchase,

provision of sites or technical expertise. The maximum loan is \$500,000.

The Act is administered by an appointed Council, linked to the Ontario Development Council. Loans of over \$100,000 must receive Executive Council approval.

b. CANADA

i. DEPARTMENT OF REGIONAL ECONOMIC EXPANSION ACT R.S.C. 1970, R-4

This Department was created with the object of acting for the federal government in matters relating to economic expansion and social adjustment "in areas requiring special measures to improve opportunities for productive employment" (s.5). These special areas are to be designated by Cabinet, in consultation with the province in question (s.6).

The Minister may then move unilaterally to formulate plans for such economic expansion (s.7), or enter into a specific agreement with that province for development and implementation of a plan (s.8). The federal contribution might include facilities, services and cash contributions.

In addition, special agreements for establishing, expanding or modernizing a specific "work" are possible where the Minister is satisfied such an undertaking is essential to the success of an overall regional plan. The agreement may be with the province concerned (s.9), or with the individual proponent of the undertaking (s.10). Alternatives include guaranteeing a loan, making a loan, or giving a grant, toward the necessary capital expenditure.

Schedules of areas designated under the Act include those which depend on wood-based industries, and those which may develop resource-based industries (SOR 70-139). In Ontario, the Renfrew-Pembroke area was designated for April 70 to June 72; this designation has been extended to June 30, 1974.

ii. REGIONAL DEVELOPMENT INCENTIVES ACT R.S.C. 1970, R-3,
am. c25 (2nd Supp.)

The criteria for designating a regional development incentive region are:

- (1) that existing opportunities for employment are exceptionally inadequate and
- (2) that modernization, or expansion of old facilities, or development of new ones will make a "significant contribution" to the solution of the problem (s.3(2)). The Minister may, at his discretion, allow incentives up to a maximum of one-half the capital to be employed in the operation (approved capital costs, any additional fixed assets, plus working capital necessary to commence operations), or \$30,000 per job created, whichever is lesser (s.5). The Act as amended imposes strict time limitations for the completion of applicant projects - December 31, 1973 at minimum and December 31, 1976 at maximum (s.9).

In 1971, a "loan guarantee" provision was added, the criteria remaining the same as for a development incentive, except that the Minister thinks an outright grant is unnecessary (s.13.1).

The Act may relate significantly to the pulp and paper industry in two ways:

- (1) creation of secondary job sources to reduce the impact on the region of lay-offs or shut-downs that may result from enforcement of abatement regulations on mills;
- (2) provision for including the cost of pollution abatement equipment when determining the amount of any incentive (s.6).

The Act is not adapted to subsidizing the installation of abatement equipment per se.

The basic regulations pertaining to these incentives are set out in SOR 69-398. The designated areas in Ontario include almost all of Northern Ontario: Algoma, Manitoulin, Rainy River, Sudbury, Timiskaming, Cochrane, Thunder Bay, and portions of Kenora and Nipissing. Also designated are the counties of Glengarry, Prescott and Stormont.

iii. INDUSTRIAL DEVELOPMENT BANK ACT R.S.C. 1970, I-9

The object of this Act is "to promote the economic welfare of Canada by increasing the effectiveness of monetary action through ensuring the availability of credit to industrial enterprises which may reasonably be expected to prove successful if a high level of income and employment is maintained". (preface).

Like the regional incentives scheme, this Act may be useful to finance new industries or expand established ones, with a view to taking the pressure off forestry or pulping activities to provide the sole economic base of an area. Besides providing that the bank may lend money, or guarantee loans, the Act permits the Bank to underwrite the whole or any part of an issue of stocks, bonds or debentures of the client company.

7. Research Incentives

(a) CANADA

- i. FORESTRY DEVELOPMENT AND RESEARCH ACT R.S.C. 1970, F-30; am. c.14 (2nd Supp.)

Very general powers are conferred by this Act on the Minister of the Environment. Within the limits of his powers as set out in the Department of the Environment Act, RSC 1970 (2nd Supp.), c.14, he is instructed to "provide for research into the protection, management and utilization" of the forest resources under federal jurisdiction (s.3(1)(a)). There is no specific provision for joint federal-provincial studies (although these are clearly not prohibited either). Mandate to involve itself with private industry is limited to a power to conduct economic studies with respect to forest industries, and marketing of forest products. There is no direction to explore issues of conservation or environmental protection in relation to forest industries.

- ii. INDUSTRIAL RESEARCH AND DEVELOPMENT INCENTIVES ACT R.S.C. 1970, I-10; am. c.18 (1st Supp.); 1970-71-72, c.43, c.63

A corporation may apply to the Minister of Industry, Trade and Commerce for partial reimbursement of any expenditure made for scientific research and development in a fiscal period of the corporation (s.3). The criterion for award of the incentive is that the research "is likely to result in benefit to Canada if it is successful" (s.3(2)). By regulation, Cabinet has defined "benefit to Canada" in terms of these considerations:

- (a) whether it was done for the purpose of strengthening or extending the business in Canada, and
- (b) whether the results may be exploited in Canada and on the export market. (SOR 67/269; 70/318)

The regulations neither specifically include or exclude developments in pollution abatement, but a persuasive case could be constructed that such research strengthens the business in Canada, and that any discovery would be marketable per se internationally.

There are limits set to the kinds of capital expenditure eligible for reimbursement (s.4(4)); eligible current expenditures include in-house research by the applicant, and also payments to a university, research insitute or another corporation for research contracted out to them (s.5(1)).

The grant is not subject to income tax (s.9), and may be applied against tax liability of the applicant (s.*(2)).

8. Agencies Which Administer the Statutes

a. ONTARIO

Ministry of Energy	<u>Pollution Abatement Incentive Act.</u> R.S.O. 1970 c.352 as amended 1972, c.1, s.72
Ministry of Natural Resources	<u>Lakes and Rivers Improvement Act</u> R.S.O. 1970 c.233 amended 1971 c.50, s.50
Ministry of the Environment	<u>Environmental Protection Act</u> S O. 1971 c.86 amended 1972, c.106 <u>Ontario Water Resources Act</u> R.S.O. 1970 c.332 amended 1972 c.1, s.70
Ministry of Health	<u>Public Health Act</u> R.S.O. 1970 c.377 amended 1971, c.95 1972 c.80
Ministry of Natural Resources	<u>Public Lands Act</u> R.S.O. 1970 c.380, amended 1971, c.46; 1972 c.4 s.19; 1972 c.29 <u>Crown Timber Act</u> R.S.O. 1970, c.102 amended 1971, c.23; 1972, c.4 s.16; 1972, c.26 <u>Forestry Act</u> R.S.O. 1970, c.181; amended 1971, c.17; 1971, c.50 s.42 <u>Woodlands Improvement Act</u> R.S.O. 1970, c.502 <u>Provincial Parks Act</u> R.S.O. 1970 c.371; amended 1971 c.16; 1972, c.1 s.87; 1972 c.27 <u>Wilderness Areas Act</u> R.S.O. 1970, c.498 <u>Settlers' Pulpwood Protection Act</u> R.S.O. 1970, c.432

Ministry of Treasury,
Economic & Intergovernmental
Affairs

Income Tax Act

R.S.O. 1970, c.217 amended 1971 c.22;
1971 (2nd), c.1; 1971 c.100; 1971
c.146; 1972 c.1 s.106

Ministry of Revenue

Retail Sales Tax Act

R.S.O. 1970 c.415 amended 1972, c.21

Assessment Act

R.S.O. 1970, c.32

Provincial Land Tax Act

R.S.O. 1970, c.370; amended 1971, c.50
s.70; 1972, c.1 s.91

Northern Ontario Development
Corporation

Northern Ontario Development Act

R.S.O. 1970, c.299

Repeated by 1973, c.84, s.27(2)

b. CANADA

Department of the
Environment

Fisheries Act

R.S.C. 1970 F-14, amended c.17 (1st
Supp.) c.14 (2nd Supp.)

Canada Water Act

R.S.C. 1970 (1st Supp.) c.5

Migratory Birds Convention Act

R.S.C. 1970, M-12; amended c.14
(2nd Supp.)

Clean Air Act

S.C. 1970-71-72, c.47

Department of Indian
Affairs: Northern
Development

National Parks Act

R.S.C. 1970, N-13

Department of Nat'l
Revenue

Excise Tax Act

R.S.C. 1970 E-13 amended 1970-71-72,
c.62 c.10 (2nd)

Customs Act

R.S.C. 1970 c.40 amended c.10 (2nd
Supp.) c.32 (2nd Supp.), 1972 c.17
s.2

Customs Tariff Act

R.S.C. 1970 c.41 amended 1970-71-72
c.65

Income Tax Act

R.S.C. 1970-71-72 c.63

Privy Council

Export Act

R.S.C. 1970 E-16

Department of Regional
& Economic Expansion

Department of Regional Economic
Expansion Act

R.S.C. 1970 R-4

Regional Development Incentives Act

R.S.C. 1970 R-3; amended c.25
(2nd Supp.)

Department of Trade,
Industry & Commerce

Industrial Development Bank Act

R.S.C. 1970, I-9

Department of the
Environment

Forestry Development and Research Act
R.S.C. 1970, F-30 amended c.14
(2nd Supp.)

Department of Industry,
Trade and Commerce

Industrial Research and Development
Incentives Act
R.S.C. 1970, I-10 amended c.18
(1st Supp.); 1970-71-72, c.43, c.63

Department of the
Environment

International River Improvements Act
R.S.C. 1970, I-22; amended c.14
(2nd Supp.)

D. MUNICIPAL POWERS

As discussed in Part 1, municipalities in Ontario have considerable authority to pass by-laws for the purpose of regulating the discharge of industrial sewage,²⁰ prohibiting the dumping of wastes into harbours and bays in the municipality,²¹ and dealing with public nuisances arising from the operation of industrial enterprises.²² The figures below represent part of the results of a survey of the extent to which these powers have been adopted and used in municipalities where pulp and paper operations are located.

The first part of the survey involved sending a questionnaire to all municipalities having pulp and paper mills. Two questions were asked. The first question inquired whether the municipality had, in fact, passed any by-laws regulating industrial enterprises under the enabling provisions of the Municipal Act. Secondly it was asked whether there had been occasion to enforce these by-laws during the past 10 years. The results of the questionnaire are presented in Table II-2.

Of the questionnaires returned, 45% of the municipalities did have such by-laws, and approximately 25% had enforced them within the past ten years.²³ The results varied significantly from region to region. Of the northern municipalities, only 20% had by-laws at all, and there had been no prosecutions recently. The more densely populated southern and eastern regions were more active both in enacting and enforcing regulations of this sort.

20 Municipal Act, RSO 1970, c.246, s.354(1). 71 - .73, 129

21 Ibid., s.352.48,.49

22 Ibid, s.242, s.354(1) .114-.116

23 The rate of return was 75%. It is assumed that enforcement involved legal action to compel compliance, not merely persuasion.

TABLE II-2

RESULTS OF A SURVEY TO DETERMINE WHETHER MUNICIPALITIES HAVING PULP AND PAPER MILLS HAVE PASSED AND ENFORCED BY-LAWS REGULATING WASTE DISPOSAL OF AN INDUSTRIAL OPERATION

Regions	Northern	Central	Eastern	Southern	TOTAL
No. of question- naires sent	10	5	6	6	27
No. of replies received	10	2	4	4	20
Municipalities having By-Laws	2	1	3	3	9
Enforcement within past ten years	0	1	2	2	5

The questionnaires were followed up with telephone interviews with the clerks and engineers of the municipalities surveyed. These conversations revealed that even where by-laws do exist, they concern themselves almost exclusively with industrial wastes discharged into the municipal sewer system. Municipalities have not attempted to regulate dumping directly into public waters. Furthermore, the reasons for the disparity among regions become clear when the situation of a small town is considered. To begin with, the town has neither the funds nor personnel with the necessary expertise, to assume the role of regulating a major industry's activities. Hence, many of them did not have a by-law enforcement officer. In some cases, the mill itself is located in a remote area where the polluting effects have little or no impact on the town. It is obvious that a small town, with a pulp mill as virtually the only employer, is not in a good position to insist on expensive abatement measures.

In general, municipalities regard the pollution of major watercourses as a matter for the province to deal with. In most cases, there has been a long-standing tradition that the mill deals directly with the provincial regulatory agency, by-passing the municipal council. Sometimes the council has a voice in the negotiations, but the initiative is nearly always taken by the province. Several of the large mills discharge effluent into international boundary waters. The attitude of the municipalities in this situation is that only the federal and provincial authorities are able to deal with enterprises whose impact is international.

Until the adoption of the Ontario Air Pollution Control Act, the municipalities were expected to deal with air pollution problems.²⁴ Now, however, it seems to be assumed by the municipalities that the Ontario Ministry of the Environment has exclusive responsibility for air pollution at least when it stems from a major industrial establishment. Several municipal officers said they referred complaints directly to the provincial authority.

Large municipalities with greater resources tend to enforce their by-laws. Metropolitan Toronto, Scarborough and Ottawa all predictably have by-laws related to industrial effluents and have enforced them.

24 RSO 1970, c.16; rep. 1971, c.86, s.104

E. PROSECUTIONS OF PULP AND PAPER COMPANIES

The maximum penalty for an offense under s.27(1) OWRCA R.S.O. 1960 c.281 was a \$1,000 fine or 1 year imprisonment or both. This penalty was subsequently amended (R.S.O. 1970 c.124 s.10(1)) to \$5,000 or 1 year imprisonment or both for a first conviction and \$10,000 or 1 year imprisonment or both for each subsequent conviction. From January 1967 to December 1971, there were nine prosecutions of pulp and paper companies under the old section. The public prosecutions which did take place are set out in Table II-3 infra. One of the charges, that against Kimberly-Clark Ltd., was quashed and, in the remainder of the cases, fines imposed upon conviction ranged from \$350 to the \$1,000 maximum fine.

The existing precedents regarding cases under the relevant legislation are R. v Matspeck Construction Ltd. (1965) 2 O.R. 730, which held, inter alia, that no duplicity is contained in a charge under s.27(1) OWRCA (now s.32(1) OWRCA); and R. v Industrial Tankers Ltd. (1968) 2 O.R. 142 which held that liability under the relevant section is strict and no mens rea (intent) need be proved by the Crown in the prosecution of the charges. In addition, Industrial Tankers held that a corporation is liable for the acts or omissions of its employees when those acts or omissions cause a contravention of the provisions of the Act.

The available decisions in these cases give some basis for optimism. In the Garden City Paper Mills case, Garard, Prov.-Crt. J., in handing down a conviction and imposing a \$700 fine, implied by his comments that "Approval Certificates" issued under the Act do not constitute statutory authority to pollute the water, and that any final approval of a work or undertaking is primarily based upon its effectiveness rather than its

TABLE II-3

PROSECUTIONS OF PULP AND PAPER COMPANIES

JANUARY 1967 - DECEMBER 1971

UNDER s.27(1) ONTARIO WATER RESOURCES ACT

(now s.32(1) ONTARIO WATER RESOURCES ACT

R.S.O. 1970 c.332 as amended).

Date Information Laid	Date of Hearing	Name of Company	Charge	Final Disposition
1, Nov. '68	27, Mar. '69	Brown Forest Industries Ltd. Sudbury	s.27(1) O.W.R.A.	Conviction \$500. Fine
29, Nov. '69	22, Jan. '70	Domtar Newsprint Ltd. Red Rock	s.27(1) O.W.R.A. 2 counts	Conviction- \$1000. Fine 1 Count Withdrawn
Unknown	4, Feb. '71	Garden City Paper Mills St. Catharines	s.27(1) O.W.R.A.	Conviction \$700. Fine
Unknown	4, May '70	Abitibi Paper Co. Ltd. Thunder Bay	s.27(1) O.W.R.A.	Conviction \$350. Fine
28, Jan. '70	18, May '70	Eddy Forest Products Ltd. Espanola	s.27(1) O.W.R.A. 4 counts	Conviction \$1000. Fine on each Count
14, Apr. '70	17, June '70	Abitibi Paper Co. Ltd. Smooth Rock Falls	s.27(1) O.W.R.A. 3 counts	Conviction- \$1000 Fine on each of 2 Counts- 1 Count Withdrawn
Unknown	26, June '70	Beaver Wood Fibre Co. Ltd. Thorold	s.27(1) O.W.R.A.	Conviction \$700. Fine
Unknown	20, July '70	Kimberly-Clark of Canada Ltd. St. Catharines	s.27(1) O.W.R.A.	Quashed
Unknown	28, April '71	Abitibi Panel Products Sturgeon Falls	s.27(1)) W.R.A.	Conviction \$500. Fine

mere existence.²⁵ In the Domtar Newsprint case, Connor, Prov.-Crt. J., in finding against the defendant and imposing a \$1,000 fine, clearly stated his opinion that the existing fines were too low, and that the legislation required "more teeth".^{26,27} Judge Connor also referred to the fact that "we are a little late in this country in taking a stand against pollution" and referred to the desirability of passing down a heritage of lakes, not cesspools".

His Honour added, "Penalties are sometimes considered as more or less a collection, as licenced permission. They shouldn't be, they should be to deter, to prevent a situation which is wrong and to remove that situation."²⁸

25 Oral decision, June 5/70, unreported.

26 Oral decision, January 22/70, unreported.

27 The maximum fine has since been changed. However, there have been no prosecutions initiated against pulp and paper companies under the OWRCA since this amendment.

28 op. cit. footnote 26 supra.

F. PRIVATE REMEDIES

1. Introduction

The pollution control legislation discussed in Section C is public law. It arises from the fairly recent governmental concern for the generalized problem of environmental degradation. The common law courts, in their own way, have been confronted with the same issues on a private scale for many centuries. As a result, a number of distinctive "causes of action" have evolved for initiating private proceedings concerning environmental damage. Each has its own peculiar elements and scope of remedy. There are three major causes of action; nuisance, riparian rights, and trespass. Actions in negligence and those based on the "Rylands v Fletcher"²⁹ * doctrine are of peripheral importance.

The advantage of the common law causes of action is that, with one exception, they offer certain private persons the capacity to take the initiative against persons damaging the plaintiff's rights in his environment. This discussion will not speculate at length upon the possibility of expanding these doctrines. Most of the standards are worded so broadly that it could be argued that they would apply to almost every instance of polluting activity. In fact, there are real limitations to the future usefulness of the private remedy in halting environmental damage, and they lie primarily in factors outside the doctrines themselves. These will be discussed later.

2. Nuisance

Nuisance is subdivided into two categories: public and private. The distinction involves the nature of the right interfered with to give rise to the cause of action.

Public nuisance is an act or omission which obstructs or causes inconvenience or damage to the public in the exercise of rights common to all Her Majesty's subjects.³⁰

*The remainder of the footnotes are presented at the end of the chapter.

These rights usually pertain to uses of the public domain such as the right to fish in or to navigate lakes and rivers. Public nuisance extends, however, to any material interference with public health, safety, and comfort.³¹ It is important to note that interference with purely aesthetic comforts is not included in the scope of a public nuisance.

The acts objected to need not in fact affect the entire public, but must be of such a nature that they would interfere with the rights of any member of the public who encountered them.³²

The only defence available against a suit in public nuisance is statutory authority. It is impossible to acquire a prescriptive right to commit a public nuisance; nor is it relevant that there are other persons contributing to the damage suffered.³³ Finally, it makes no difference that the defendant is using his land reasonably without negligence, so long as the effect is an unreasonable incursion upon the public right.

Grounds for public nuisance can include emission of contaminants, odours, noise or vibrations into air or water, if they materially interfere with fishing, health or normal comfort of a class of the public. It thus appears to be a perfect source of relief from mill pollution.

The drawback is that no individual has standing to sue on the public interest, except in the special circumstance that damage to the plaintiff differs in kind from that of the public.³⁴ This qualification depreciates the value of the action in controlling the pulp industry, since the detriment it causes to a community tends to be generalized, and to affect all in much the same way.

In fact, in 1934 a commercial fisherman in New Brunswick attempted to rely on public nuisance to enjoin a pulp and paper mill from dumping its wastes into the bay where he fished.³⁵ The court declined to recognize that his damage was any different from that of the public except in degree, despite the fact that fishing was the source of his livelihood.

Private nuisance is interference with an individual's right to the use and enjoyment of his property.³⁶ It may be grounded in actual damage to the property (including damage to its value), or in a sensible impairment of the individual's enjoyment and personal comfort in the use of that property. The standard of comfort protected is not a subjective one, and does not extend to matters of "mere delicacy or fastidiousness". What is protected is the ordinary comfort, physically, of human existence", as judged by "plain, sober notions".³⁷ In order to have standing to sue, then, the complainant must have some property interest (even that of a tenant) which is being impaired. This condition immediately limits its usefulness for controlling a pulp and paper mill, since the worst offenders tend to be situated in sparsely-populated areas, with mill employees comprising most of the private property owners in the area. The cause of action is beyond the reach of a public spirited non-resident whose only interest in the issue is a general aversion to environmental degradation.

Two major defences are available to a private nuisance suit. If the defendant can show he has express statutory authority to create the nuisance, he is beyond private action. Simply to be licensed to operate is not enough, unless the licence prescribes the mode of operation, and the obvious and necessary effect of such process is to create a nuisance.³⁸

Prescription can be a valid defense against private nuisance although it is not relevant in cases of public nuisance.³⁹ However, whenever there is an alteration in the degree of nuisance produced by the plant, a new prescriptive period commences. A mill cannot discharge ten tons of wood fibre a day for 15 years, increase the volume of discharge to 20 tons a day for 5 years, and then claim to have established a prescriptive right to discharge 20 tons a day. The private right of action has revived.

In 1922 a suit in nuisance against the Canada Paper Company was carried to the Supreme Court of Canada.⁴⁰ A neighbour alleged the odours from the sulphite process created a material infringement of his comfort and enjoyment of his home. The company raised the argument so often heard to justify political decisions to tolerate pollution: employment of the sulphite process in the mill sufficiently enhanced the prosperity of the town to justify infringement of the plaintiff's private rights. Although considerations of public welfare are never an absolute defence to a nuisance action, in some cases the court will be influenced by these factors to substitute money damages for the traditional injunction.⁴¹ In the Canada Paper suit, the court was not satisfied that the mill could find no alternative to the offending process, and invoked the injunction. Conservationists would be heartened at the parting words of Mr. Justice Idington:

"The invasion of rights incidental to the ownership of property may suit the grasping tendencies of some, and incidentally the needs and desires of the majority, (but) such a principle of action should be stoutly resisted by our courts".

The list of ineffectual defences to a nuisance is lengthy.⁴² It is no defence that the defendant is making a reasonable use of his land, or that his activities are carried on without negligence. Nor is it a defence that he has installed the best available technology for control of the nuisance. It is irrelevant that other persons contribute to the nuisance. The defendant cannot ask for excuse because of the disparity between the cost of abatement to his enterprise, and the damage the individual plaintiff is suffering. Like the "public welfare" consideration, these matters do not change the fact that the person responsible for a nuisance is liable to the person whose rights are infringed upon. It is very important, however, to realize that the factors of public welfare, best available technology, and so on, can be weighed in deciding whether to order an injunction, or simply an amount of money damages to the plaintiff.⁴³ If a private litigant is motivated by a desire to see pollution abated, for his own sake and that of the environment at large, money damages are a poor substitute for the injunction. The reasons for this contention will be expanded upon in the discussion of inroads in the common law remedies.

3. Interference With Riparian Rights

Interference with riparian rights is a subcategory of nuisance. The riparian right is in essence a non-corporeal right incidental to the ownership of land through which a current of water passes (usually a river, but technically a lake also). In the seminal case, John Young v. Bankier Distilleries,⁴⁴ the court stated:

"The riparian proprietor is entitled to the water of his stream, in its natural flow, without sensible diminution or increase and without sensible alteration in its character or flow".

This doctrine dates back to Roman Law. At its root is the recognition that all persons living along a watercourse

depend upon the water flowing past for their primary domestic purposes, and that an upstream dweller exceeds his lawful powers when he uses the water so as to deprive a downstream owner of his rightful use. The riparian action is distinct from an ordinary nuisance in that the plaintiff need show no actual harm to himself to have a cause of action. Any sensible change in quantity or quality constitutes an infringement on his notional rights, and injury to a right is actionable even if no damage is done.

The most famous of all court cases involving pulp and paper mills was an action by seven riparian land-owners along the Spanish River (near Espanola) against the Kalamazoo Vegetable Parchment Co. Ltd. - the K.V.P. case.⁴⁵ In an exhaustive judgment, Mr. Justice McRuer carefully examined the overwhelming evidence of impairment to the quality of the Spanish River, and its devastating effects on the domestic utility of the water. He confirmed that the ineffectual defences to a nuisance could not be applied in a riparian suit either. In ordering an injunction against the offending mill, he did not even consider the alternative of assigning pecuniary damages to the plaintiff's as a substitute. The decision was a high water mark for the riparian land-owner, as it proceeded without reversal through the Ontario Court of Appeal⁴⁶ and the Supreme Court of Canada.⁴⁷ The Government in power attempted to intervene in the course of the appeals by enacting an amendment to the Lakes and Rivers Improvements Act.⁴⁸ The amendment amounted to a statutory direction that in a civil action, a court was to consider the significance of the mill to all the inhabitants of the region, and suggested that an injunction was improper if that significance was found to be substantial. The superior courts did not find the amendment compelling. The injunction stood. Finally in 1950 the government was obliged to pass a private bill dissolving "every injunction heretofore granted against the KVP Company."⁴⁹

The Act claimed not to prejudice any future right of action against the company arising from pollution of the waters of the Spanish River; but it hinted strongly that that the only remedy that would be tolerated would be an award of damages, and even provided for swift out-of-court arbitration of disputes.

The riparian action, then, remains potent and intact in law, however, legislative interference has impaired the effectiveness of this principle in Ontario.

Trespass is defined as an invasion of an individual's rights to exclusive possession of his land.⁵⁰ In the past, a direct invasion (and resulting damage) was trespass while an indirect one was nuisance. In light of modern awareness of the damaging effects of minute particles, and of transmission of energy, the nature of events that the law will recognize as a direct invasion is changing. In 1959, an Oregon rancher recovered damages in trespass for damage to his land and livestock from flouride gases emitted by a metals plant.⁵¹

Traditionally, once the plaintiff established an invasion of his land, the party responsible was strictly liable for any damage resulting. There is no case law in trespass dealing with reasonability or absence of negligence on the defendant's part. As the concept of "invasion" becomes more sophisticated, however, so does the test to determine liability for the results. Courts will be inquiring whether the alleged "trespass" actually did invade some legally protected right of exclusivity of ownership. The doctrines of trespass and nuisance, then, approach merger at least with respect to the sorts of invasion resulting from emission of contaminants into water; gases and particulates into the air. Trespass, it is predicted, will not be any simpler an action to pursue than nuisance against a paper mill.

There is an old Ontario case (1920) which admitted that, "in respect of the soot and carbon coming from the defendant's chimney, plaintiff has established at least a nominal cause of action in trespass."⁵² The defendant was a pulp and paper mill. This minor authority is hardly a compelling precedent, but it does demonstrate that an action in trespass against pollution from a mill is not unthinkable. It offers a "peg" for the court to "hang its hat on", if it so chooses.

4. Other "Causes of Action"

Two other causes of action have peripheral application to environmental problems, but because of their nature, are not likely to be of use against a pulp mill. The first, negligence, is only actionable where the plaintiff can establish the defendant had a duty toward him, personally, to take care.⁵³ Secondly, the defendant must have been able to foresee the resulting damages to the plaintiff. Although the foreseeability element may be satisfied,⁵⁴ the law has still not advanced to the point that it recognizes any general duty on private enterprise with respect to environmental protection for the sake of others. Moreover, a plaintiff would have to prove the industry carried on its business on a lower standard than that which is usual in similar enterprises. Altogether, negligence is virtually impossible to establish against industry within the current scope of the law.

The other cause of action is a strict liability doctrine derived from an 1868 case, Rylands v Fletcher.⁵⁵ While the case turned very much on its own peculiar facts, the court attempted to enunciate some general principles which would serve as a test for further application of the doctrine.⁵⁶ It concluded that, as soon as a person begins a non-natural use of his lands, he becomes instantaneously liable should there be a resulting escape of some substance which harms another person's property.

A second judgment introduced the notion that simply the keeping on one's land of a substance likely to do mischief if it escapes is sufficient cause for action.

Clearly, indiscriminating application of the tests derived from the Rylands v Fletcher case would result in strict liability for almost any sort of emission of contaminants, if they did any harm to other property.⁵⁷ These tests would also quickly supplant the long-established actions in nuisance and negligence, and invalidate tests for liability which represent centuries of delicate judicial balancing of interests. Although the doctrine was recently applied in Saskatchewan to allow recovery for crop damage from pesticide drift, the court had to strain the construction of non-natural use to great lengths in order to do so.⁵⁸

Generally, the substance which escapes must be innately dangerous to incur strict liability.⁵⁹ The test of "dangerousness", coupled with the fact that the substance must damage the plaintiff's property directly, renders the doctrine unsuitable for instituting actions against dischargers of by-products of a normal manufacturing process into air and water.

5. Private Rights and Government Enforcement

In the past three years, some environmental pressure groups in Ontario have experimented with the possibilities of introducing the private litigant into the process of administering statutory law. It is clearly the prerogative of a private informant to prosecute a summary conviction offence independently from the administrative authorities.⁶⁰ All offences in pollution abatement statutes are summary in nature. Private prosecutions can be immensely useful, since they focus public attention on the offender and promote political action to remedy the problem. They can have the effect of imposing an interim injunction on the accused, and involve no costs to the informant unless his allegation was absolutely frivolous.⁶¹ The private prosecution also

has defects which are quite apparent when one considers the applicability of the action to the pulp and paper industry. In the first place, the result of a criminal action is a cash penalty. This does not remedy the actual problem. Second, where the statute provides for an approved plan of remediation and the mill is operating under such a plan, it is immune from prosecution. The sanction is suspended despite the fact that the existence of an approved programme carries no legally enforceable guarantee that the offence will cease by the stated completion date.⁶²

Attempts have also been made to press government officials into exercising their powers in a certain way, under the statutory instruments they administer.⁶³ The vehicle is a judicial order known as "mandamus". This order will only attach, however, where there is an express duty clearly outlined in the statute; it cannot be used where the language of a statute confers discretion to act on an official. Only the Public Health Act⁶⁴ in Ontario creates a duty in its officials, while the terms of the Environmental Protection Act⁶⁵ and the Ontario Water Resources Act⁶⁶ are unambiguously discretionary. Mandamus is therefore, ineffectual to compel any particular administrative action on environmental matters. For the same reason, an objector cannot look to the courts to review an administrative decision under the existing environmental legislation in Ontario.⁶⁷ In addition, there is a problem of standing to ask the court for any of these special remedies. Plaintiff must demonstrate a special interest in the decision before he has a right to request a review of it. In the eyes of Canadian courts, special interest coincides with an economically valuable property interest.

One private litigant recently attempted to assert that the government operated under a public trust to the people of the province in relation to the environment.⁶⁸ The legal trustee/beneficiary relationship is an onerous one; recognition of such a duty would amount to the grant of an environmental "bill of rights" to every citizen. The action was unsuccessful. Public trust in the environment is a concept of the future in Canada.

6. Obstacles to Common Law Remedies

In theory, common law remedies appear to offer effective tools in the hands of a private person for producing remedial action among polluters. In fact, there are considerable obstacles to their utility. In the first place, the doctrines developed to afford relief to people whose personal rights in property were being damaged and proof of such an effect is a necessary element of any private action. Because many of the most offensive pulping operations are located in relatively remote areas, there are limited numbers of private citizens who could even claim a cause of action. Many of these are inhabitants of a "one-industry" town and depend on the mill for their livelihood. In short, without a complainant there is no case. Most laymen feel insecure in challenging the company's assertion that it is doing all it can to abate pollution.

Secondly, a private civil action is expensive and time-consuming. It is unrealistic to imagine an individual complainant is on equal footing with a corporation, all verbiage about equality before the law aside.

A private citizen normally has access neither to the expertise, nor to the money, to mount a case. There is little incentive to attempt a test case against a major enterprise, with the prospect of a long series of appeals and only partial recapture of costs even if the plaintiff is successful.

Thirdly, a private law suit, in the short run, operates only against the individual polluter who is party to the action. Naturally, it is not easy to measure the indirect effect on similar enterprises, of an unfavourable decision against one of their number. Intensive litigation by individuals, combined with an assumption by the judiciary of liberal attitudes toward enforcing private rights, might produce a remarkable surge of preventive efforts in industry. Such sanguine visions are, however, pure speculation. The more likely industrial response is resentment of interference by the courts, coupled with righteous annoyance that members of the public should choose any one enterprise to pursue when many are doing the same thing and "getting away with it". In the fourth place, private law does not recognize the value of aesthetic beauty, and is a clumsy tool for the conservationist or land use planner.

The final threat to the private environmental suit derives ironically, from the public authorities whose mandate is to protect the public interest at large.

The function of the legislature and its statutory agencies is to balance interests according to political priorities. Environmental degradation may be secondary to employment, revenue or export considerations. On the other hand, private individuals have traditionally been able to look to the courts for a decision unaffected by policy, focused exclusively on damage to the individual. This places the court in the anomalous position of possibly disrupting the operation of a carefully planned and balanced management scheme. Civil courts have no inherent jurisdiction at common law to criticize or upgrade the standards set by administrative authorities or to override their decisions.⁶⁹ The Canadian response to this uneasy juxtaposition of laws is a trend toward diminution of the

private right. These developments are best traced through an examination of statute law, and judicial convention as evidenced in case law.

To begin with, the traditional remedy of injunction for nuisance is in danger. In the past, injunction was a tool the court could employ to force a polluter to go to the extra expense of installing abatement technology, or to put pressure on the industry to develop such equipment. Injunctions were never enforceable from the day of the order; there was always a period of suspension, a time allowance for finding alternative measures to abate the nuisance.⁷⁰ The spectre of immediate shutdown is a false one.

The alternative to injunction, permanent damages, represents the loss by the private complainant and the public at large of the opportunity to oblige the polluter to respect the environment over the costs of the clean-up. It also has the effect of depriving any future owner of that property of a right of action on the nuisance. Permanent damages run with the land; they amount to an enforced "sale", to the defendant by the plaintiff, of the rights which are infringed upon by the nuisance.

Courts are becoming much less confident about requiring that polluters clean up their operations. Moreover, the larger the pollution the greater will be the cost of the clean-up, and the greater the disparity between his costs and those of the damaged plaintiff. The dominant court attitude is that, if the polluter is to be stopped and the appropriate agency has the power to do so, it is in that forum that the full spectrum of economic and social implications of such a decision are to be considered.

The legislature has, in the past, promoted this trend by passing provisions like s.37(1) the Lakes and Rivers Improvement Act, and the Act Respecting the KVP Co. Ltd.⁷¹ In some instances it has removed the common law remedy entirely. Section 33(5) of the Ontario Water Resources Act gives statutory authority for the activities of any sewage works (both industrial and municipal by definition) which is constructed and operated under the discretionary approval of the MOE. The Mining Act⁷² provides that the Mining Commissioner may require landowners to forego their property rights in favour of a mine which wishes to dump tailings on their land, or into waters on which their property abuts. Compensation is assured, but the primacy of the private right is subverted. This provision does not apply to paper mills, but it is indicative of the premium which the legislature has placed on encouraging primary resource industries.

7. FOOTNOTES to Section F.

- 29 (1868) L.R.3 H.L.330
- 30 Prosser on Torts, 4th ed., p.583
- 31 Ibid, supra
- 32 A-G British Columbia, ex. rel. Eaton v. Haney Speedways Ltd. (1973) 39 D.L.R. (2d) 48.
- 33 By virtue of s.31 of the Limitations Act, RSO 1970, c.246, a person may obtain the right to infringe on some other private right if he has openly carried on the infringing activity, without cessation or alteration in degree, for a period of 20 years or more. The part whose rights are diminished must have known of the "dominant" party's acts, and must not have objected to them over the course of the prescriptive period. His apathy is construed in law as acquiescence, and at the end of the period he loses his right to protest altogether. He assumes the role of a "servient" tenement, to the extent of the impairment of his rights affected.
- 34 Prosser, supra
- 35 Fillion v. New Brunswick International Paper Co. (1934) 3 D.L.R.22
- 36 Fleming on Torts, 4th ed.
- 37 Walter v. Selfe, (1851) 4 De.G. & Sm. 315
- 38 Nipisiquit v. Canadian Iron Corp. (1913) 14 D.L.R.752
- 39 See footnote 4a supra
- 40 Canada Paper Co. v. A.J. Brown (1922) 63 S.C.R.752
- 41 This was the judgment of Duff, C.J.; the two other justices who sat on this case differed from him on that point. Nevertheless, his judgment was later adopted as authority in Bottom v. Ontario Leaf Tobacco Co. Ltd. (1935) O.R.205
- 42 See the decision of Justice McRiver in Russel Transport v. Ontario Malleable Iron Co. Ltd. (1952) 4D.L.R.719 for a discussion of these.
- 43 These were significant factors in the Ontario Leaf Tobacco case, cited 11 supra.
- 44 [1893] A.C.691
- 45 McKie et al. v. The K.V.P. Co. Ltd. [1948] 3 D.L.R.201
- 46 [1949] 1 D.L.R.39
- 47 [1949] S.C.R.698
- 48 Now s.37, Lakes and Rivers Improvement Act, R.S.O. 1970,c.233

- 49 The K.V.P. Co. Ltd. Act, S.O. 1950 (Private Act)
50 Martin v. Reynolds Metals Co. 221 Ore.86
51 Ibid, supra.
52 Young v. Fort Frances Pulp and Paper Co., (1920) 17
O.W.N.466
53 Fillion v. New Brunswick International Paper, (1934) 3 D.L.R.
22
54 It is hoped that courts today are more demanding with respect
to what damage they expect an industrialist to foresee as a
result of pollution he creates, than they were in 1934 when
Fillion was decided.
55 Footnote 1, supra
56 A neighbour had accumulated a reservoir of water on his own
lands, for his mining purposes. It subsequently leaked into
the plaintiff's mine shafts.
57 The doctrine does not involve itself with the finer issues of
notional rights to a clean environment.
58 Mihalchuk v. Ratke et ex., (1966) 55 W.W.R.555. The court
decided as a fact that spraying herbicides from the air was
a "non-natural" as opposed to "natural" use, because it was
an unusual method at that time and necessarily involved more
risk to others than tractor - drawn applicators.
59 Bohlen, The Rule in Rylands v. Fletcher (1911) 59 U.Pa.L.
Rev., p. 298.
60 By s.720, the "prosecutor" may be the informant; the
prosecutor is entitled personally to conduct his case
(s.737).
61 Re. ex. rel. McCarthy v. Adventure Charcoal Enterprises Ltd.
(Mar. 20, 1972) Renfrew Cty. Prov. Ct. (Criminal Division).
62 The effect is to deprive a private person of power to take
any initiative, unless it can prove the company is violating
its control order.
63 Harcourt & Harcourt v. Hon. Donald C. Jamieson, Jean Marchand,
Jan Lewandowski, and Lewman Air Toronto Ltd. (Nov. 13, 1973)
Federal Court of Canada.
64 R.S.O. 1970, c.377
65 S.O. 1971, c.86
66 R.S.O. 1970, c.332
67 James Heineman v. Director of Air Management Branch, Ministry
of the Environment and Adventure Charcoal Enterprises Ltd.
(June 29, 1972) S.C. Ont.

- 68 Larry Green et. al. v. Her Majesty the Queen in Right of
Ontario and Lake Ontario Cement (Oct., 1972) S.C. Ont.
- 69 Contrast the Michigan Environmental Protection Act, 1970
- 70 See Manchester v. Farnworth [1930] A.C. 1971
- 71 See footnotes 18 and 19 respectively, supra.
- 72 R.S.O. 1970, c.274

CHAPTER III

ANALYSIS OF MARKET CONDITIONS AND STRUCTURE OF THE INDUSTRY

ANALYSIS OF MARKET CONDITIONS
AND STRUCTURE OF THE INDUSTRY

A. INTRODUCTION

1. Objectives

The economic impacts of governmental policies aimed at abating industrial pollution are contingent to a large extent on the economic conditions prevailing in the markets relevant to the industries in question. Firms' responses to such policies are constrained by these market conditions and by certain aspects of the structure of the industry to which the firms belong. Market conditions which are important include characteristics of demand, trends in product prices, and prices of inputs or costs. Changes in these market conditions can affect the quantity and the quality of waste emissions from an industrial source by resulting changes in:

- (1) the quantity of products being produced;
- (2) the quality characteristics of these products;
- (3) the technology and processes utilized in each mill;
- (4) the care with which each mill employs these technologies.

For example, a shift in consumer demand toward whiter paper would, other things being equal, increase the amount of wastes generated by bleaching processes. On the other hand, rising costs of critical inputs such as water,

wood or chemicals would stimulate firms to adopt methods of conserving these materials, thus reducing waste discharges.

The structure of a market or an industry embraces such features as the concentration of sellers and buyers, conditions of entry and exit, the locations of markets, mill ownership, vertical integration, the extent of competition and government policies. These factors can also constrain a firm's response to environmental policies. Whether environmental policies will affect the competitive position of Ontario pulp and paper depends, in part, on the structure of the markets and the industry.

An appraisal of the economic impacts of environmental policies directed at industrial pollution must, therefore, begin with an analysis of the markets and structure relevant to the industries in question. It is the intent of this section to present such an analysis of the pulp and paper industry as it relates to Ontario. A basic objective of this aspect of the study is to develop economic information about the markets and the industry which will provide a better understanding of the industry in Ontario and which can be used in the assessment of policy alternative

2. Methodology

An analysis of the relevant markets and the structure of the pulp and paper industry in Ontario will

be undertaken in the following manner. The markets relevant to the industry in Ontario will be reviewed with respect to trends, patterns and secular changes. Demand characteristics and price behavior in each product sector will be analysed to ascertain patterns of growth and price elasticities. An important objective of this aspect of the study is to assess the ability of producers to pass on cost increases to consumers.

In general, the pulp and paper industry is very capital intensive and, as such, is vulnerable to cycles of expansion and over capacity followed by declining profits and closure of marginal mills. Data will be developed to indicate to what extent the Ontario industry follows this pattern. Projections of demand and capacity growth for each product category will be reviewed and discussed. Based on this information, projections of market conditions over the next 18 to 24 months will be presented.

One of the most important concerns of the government with respect to enforcing environmental policies is the possibility of closing a mill. While it is unlikely that the government will force a mill to close in deference to environmental considerations, some mills will certainly be better able to afford the added expenditures on environmental controls than others. An analysis of the costs, revenues and the profitability of the firms and the

individual mills operating in Ontario will be undertaken so as to identify those mills which are likely to be financially distressed by incurring the costs necessary to meet the Ministry's effluent requirements.

The extent to which environmental policies will affect the competitive position of Ontario pulp and paper producers will depend primarily on cost trends and the extent of environmental restrictions imposed on competing producers in Quebec, Western Canada, the U.S. and Scandinavia. Cost components cited by the pulp and paper industry as critical to the competitive position of the industry in Ontario include labour, wood, transportation, taxation and environmental controls. The position is taken here that the Ministry of the Environment need be concerned only with the environmental costs and standards found in Ontario, relative to the environmental costs and standards in effect or being proposed elsewhere. Hence, the nature and costs of environmental legislation in competing production areas will be examined and compared with those in Ontario.

The analyses of the markets and the industry will be organized in the following manner. In section B, a brief summary of the importance of the pulp and paper industry to Ontario will be presented. Those markets relevant to Ontario pulp and paper mills will then be identified in section C. Historical trends in production,

consumption, capacity and prices will also be examined in this section. Section D will include an analysis of demand, production, capacity and price behavior. Structural features of this industry and the relevant markets will be examined and their information presented in section E. One objective of this section will be to determine whether structural aspects of the industry are of any significance to firms, environmental performance and consequently to the formation of environmental policies. The competitive position of Ontario mills relative to other, chief producing areas will also be discussed in section F. Price making and the extent of inter-firm competition in the pulp and paper industry will be the subject of section G. A detailed analysis of profitability will occupy section H. Finally, conclusions derived from the foregoing analyses will be presented in section I where those mills which are likely to suffer severe financial strains under a strong pollution abatement program will be identified.

B. IMPORTANCE OF THE PULP AND PAPER INDUSTRY TO ONTARIO

The significance of the pulp and paper industry to Ontario is documented by the data presented in Table III-1.

The category "Pulp, Paper and Allied Industries" includes felt roofing manufacturers, box manufacturers and envelope makers as well as pulp and paper mills. All of the firms coming under this definition of the pulp and

TABLE III-1

THE ECONOMIC IMPORTANCE OF THE PULP AND PAPER INDUSTRY TO ONTARIO

	Ontario Total	Pulp, Paper and Allied Industries	% of Ontario Total	Pulp and Paper Mills	% of Ontario Total	Rank of Pulp, Paper and Allied Industries
Employment:						
Manufacturing (000)	574.7	34.3	6.0	17.9	3.1	
Total (000)	825.5	45.8	6.0	21.5	2.6	8
Value Added:						
Manufacturing (\$ 000)	10,637,008	593,657	5.6	340,195	3.2	1
Total Activity (\$ 000)	11,523,267	614,083	5.3	343,333	3.0	5
Wages (\$ 000)	5,660,929	331,862	5.9	168,770	3.0	7
Value of Shipments (\$ 000)	23,847,773	1,298,696	5.5	715,966	3.0	5

SOURCE: Statistics Canada, Manufacturing and Primary Industries Division,
Manufacturing Industries of Canada: Ontario (Ottawa:
Statistics Canada, 1969)

paper industry employ about 6 percent of the total work force in Ontario. Pulp and paper mills alone account for about 2.6 percent of the total provincial work force. The industry pays almost 6 percent of the total wage bill in Ontario and ranks seventh in this category. In 1969, value of shipments by the industry amounted to about \$1.3 billion or 5.5 percent of the total value of shipments for the Province. During the same year, for which the most recent data is available, the industry ranked fifth in value added for total activity. Moreover, in this same year, pulp and paper mills earned 3 percent of the value added in total activity. Only the automotive, steel and machinery industries exceed pulp and paper in terms of total value of shipments and value added.

C. IDENTIFICATION OF MARKETS RELEVANT TO THE ONTARIO PULP AND PAPER INDUSTRY

1. Introduction

In this section, the markets currently served by the Ontario pulp and paper industry are identified with respect to products and locations. Production, shipments and price data are analysed for secular patterns. The geographical limits of the consumers of Ontario papers products are also be examined.

The markets served by the pulp and paper industry may be apportioned into three broad product categories:

market pulp, newsprint, and other paper and paperboard products. The total amounts for each of these product groups produced in all of Canada, Ontario, Quebec and British Columbia during 1973 are presented in Table III-2. Based on this data, Ontario currently produces about 20 percent of the paper and paperboard products which are manufactured in Canada.

2. Pulp Market

An overview of current pulp production in Canada and Ontario is presented in Table III-3 for 1971, the latest year for which disaggregated data is available. It is clear from this data that groundwood sulfite and kraft (sulfate) pulps are the primary pulp grades produced in Canada and Ontario. Over 40 percent of the wood pulp made in Canada and Ontario is groundwood or mechanical pulp which, along with sulfite pulps, is the principle ingredient of newsprint. Of the chemical pulps, kraft or sulfate pulp is by far the more important. Forty percent of Canadian pulp production and 35 percent of Ontario's total output of pulp is manufactured by means of the sulfate pulping process. A wide variety of paper and paperboard products are manufactured with kraft process fibres including newsprint, fine papers, wrapping and packaging papers and boxboard. Semi-chemical and dissolving pulps are used to make cellophane and other specialized products. There is only one dissolving pulp mill in Ontario.

TABLE III - 2

PRODUCTION OF PULP, NEWSPRINT AND PAPER
PRODUCTS, CANADA AND SELECTED PROVINCES -
1973 ('000 tons)

	<u>Pulp, all grades</u>	<u>Newsprint</u>	<u>Other paper and paperboard</u>
Canada	19,827.4	8,966.3	4,141.0
Ontario	3,992.7	1,921.7	1,411.0
Quebec	5,961.6	3,981.8	1,631.9
British Columbia	4,785.4	1,470.7	723.3

SOURCE: Canadian Pulp and Paper Association
Provincial Pulp and Paper Statistics - 1973
(Montreal: C.P.P.A. February 1974)

TABLE III-3

PRODUCTION OF PULP PRODUCTS IN
CANADA AND ONTARIO, - 1971

	<u>CANADA</u>		<u>ONTARIO</u>	
	'000 tons	% of Total	'000	% of Total
Dissolving and special "Alpha"	428.1	2.4	N/A	
Sulphite	2,527.1	13.9	628.0	16.5
Bleached	656.8			
Unbleached, strong	190.6			
Unbleached, news grade	1,689.8			
Sulphate (Kraft)	7,132.2	39.1	1,321.0	34.8
Bleached, hardwood	797.2			
Bleached, softwood	3,450.5			
Semi-bleached	1,267.9			
Unbleached	1,616.6			
Semi-chemical pulp	331.6	1.8	N/A	
Groundwood (bleached and unbleached)	7,404.8	40.6	1,648	43.4
Defibrated and exploded	337.5	1.9	N/A	
Screenings	72.2		N/A	
Other	N/A		203.0	
TOTAL	18,233.6	100.0	3,800.0	100.0

SOURCE: Statistics Canada, Manufacturing and Primary Industries
Division, Pulp and Paper Mills, 1971 (Ottawa:
Information Canada, 1973) p. 14

The sulfite pulping process predates the kraft process so that sulfite mills tend to be older and smaller than kraft mills. Sulfite pulp is used primarily to make newsprint and groundwood specialty papers. Although a number of fine paper grades are also made with sulfite pulp, nearly all of the newsprint mills in Ontario have sulfite pulping operations associated with them. While different chemical bases are used in the sulfite pulping process, the final products are essentially indistinguishable and perfectly substitutable.

Bleaching is important from an environmental standpoint because it generates substantial increases in liquid waste discharges. The sulfite pulping process itself produces a whitened pulp depending on the wood used, so that only about 26 percent of the total Canadian sulfite pulp production is bleached. On the other hand, kraft pulp is brown in colour and must be bleached for use in many products. Almost 80 percent of total kraft production in Canada is, therefore, bleached or semi-bleached. Ninety percent of the groundwood pulp manufactured in Canada is unbleached.¹ A breakdown of provincial production data between bleached and unbleached

¹ Canadian Pulp and Paper Association, Reference Tables - 1973 (Montreal: CPPA, 1973), p. 13

chemical pulps is not available. Assuming that Ontario production of various pulp grades is proportional to Canadian production, over 800,000 tons of bleached kraft pulp and 150,000 tons of bleached sulfite pulp are estimated to be produced in Ontario each year

Looking at historical data for pulp production in Appendix D, several important trends are evident. First, the proportion of chemical pulps to total pulp production is increasing. In 1950, sulfite and kraft pulp accounted for 48 percent of total pulp production in Ontario. By 1971, this proportion had risen to 51 percent. Secondly, the production of kraft pulp has been expanding rapidly, from 23 percent in 1950 to 35 percent of total pulp production by 1971. On the other hand, there has been a corresponding decline in sulfite pulp production over the same period. While 25 percent of the pulp produced in Ontario was sulfite in 1950, this proportion declined to 17 percent of total output by 1971. Finally, there has been a steady trend toward brighter paper products over the past two decades. This has resulted in more bleaching, particularly of kraft pulp. In 1958, 48 percent of Canadian kraft pulp production was bleached. By 1971, 78 percent of total sulfate production was bleached or semi-bleached.²

² Ibid, p. 12

More will be said about the forces which are responsible for these trends in a later section.

Turning now to the actual markets for wood pulp, it is important to note that 65 percent of Canadian pulp production and about 75 percent of all pulp grades made in Ontario is consumed internally by the company which manufactures it. Hence, in 1971, out of the 18,233,600 tons of pulp produced in Canada about 300,000 tons actually entered the market during that year. Ontario mills produced 3,800,000 tons of pulp of which 2,843,000 tons were consumed either at the same mill or in mills elsewhere but owned by the same firm.

Mill shipments are, therefore, taken as the measure of the actual amounts of pulp moving through the open market, even though a small proportion of these shipments are intra-firm transfers. Shipments of all grades of wood pulp from Ontario mills averaged 1.23 million tons per year between 1971 and 1973. Thus, allowing for intra-firm transfers, about 26 percent of total Ontario pulp production is actually marketed. On the other hand, 76 percent of the pulp produced in British Columbia is sold on the market. Many of the mills in that province are new facilities designed primarily to manufacture kraft market pulp.

Two other characteristics of pulp markets must be emphasized. First of all, the market for pulp consists

almost entirely of kraft pulp. During 1971, 76 percent of the sulfite and 96 percent of the groundwood pulp produced in Canada was utilized within the same mill or through intra-firm transfers. On the other hand, only 30 percent of the sulfate pulp produced in Canada was utilized by the companies that made it. The data on pulp shipments for all of Canada presented in Table III-4 show that 6,418,792 tons of wood pulp valued at \$878,132,000 were shipped in 1971. Of this amount, 5,019,035 tons or about 78 percent of the total pulp shipments in Canada were sulfate market pulp.⁴ Sulfite pulps account for 11 percent of shipments and dissolving pulps account for about 7 percent. These data also show that nationally, 84 percent of sulfite shipments and 60 percent of kraft shipments are bleached.

The pattern of pulp production and shipments is similar for Ontario. While the industry in Ontario consumed sulfite and groundwood pulp equal to 91 percent of its total sulfite pulp production and 97 percent of its mechanical pulp production, about 50 percent of the kraft pulp made in Ontario, some 659,500 tons, is sold outside the province.⁵ In summary, kraft pulp is the primary pulp product that is sold on the open market by the Ontario pulp and paper industry.

⁴ Statistics Canada, Manufacturing and Primary Industries Division, Pulp and Paper Mills, 1971 (Ottawa: Information Canada, 1973), page 15.

⁵ Ibid, page 15

TABLE III-4

MILL SHIPMENTS AND VALUES OF WOOD PULP, 1971

<u>PRODUCT</u>	<u>CANADA</u>		<u>ONTARIO</u> ⁽¹⁾
	<u>Tons</u>	<u>\$ '000</u>	<u>Tons</u>
Dissolving and Special "Alpha"	434,355	76,848	52,000
Sulfite	697,055	95,690	
Bleached	506,688	71,683	
Unbleached	190,367	24,007	
Sulfate	5,019,035	690,309	659,500
Bleached Hardwood	648,862	86,968	
Bleached Softwood	3,119,308	445,126	
Semi-bleached	779,441	104,747	
Unbleached	571,424	53,409	
Groundwood, bleached and unbleached	242,546	14,688	49,000
Screenings	25,801	596	
TOTALS	6,418,792	878,132	

(1) Estimated from Pulpwood Use and Production data.

SOURCE: Statistics Canada, Manufacturing and Primary Industries Division, Pulp and Paper Mills - 1971 (Ottawa: Information Canada, July 1973) p. 11.

The second feature of importance is that nearly all market pulp is exported. Of 6,418,792 tons of wood pulp shipped in 1971, 5,676,000 tons or 88 percent were exported.⁶ Table III-5 shows the relative amounts of different grades of pulp exported during selected years. It is clear that kraft pulp is dominant in this aspect of the market as well, currently accounting for 80 percent of total wood pulp exports. Note that the relative and absolute amounts of sulfite pulp exports have been declining slowly over the past decade while exports of mechanical and dissolving pulps have not changed appreciably over the entire time period represented in Table III-5, although exports of dissolving and special alpha pulps have experienced a decline since 1969. Exports of dissolving pulp from Canada accounts for 82 percent of total production and 80 percent of the shipments of this product.

Fifty-nine percent of all pulp exports go to the United States. Europe takes about 21 percent of Canadian pulp exports, Japan - 7 percent, the United Kingdom - 6 percent, and Latin America - 2 percent.⁷

Wood pulp enjoys virtually free trade conditions since the United States and Britain charge no tariffs on Canadian pulp. Access to the European Economic Community is, however, more restricted as member countries allow pulp imports duty-free up to 1,934,000 metric tons. Any pulp

⁶ Ibid, page 11

⁷ CPPA, Reference Tables - 1973, page 11.

TABLE III - 5

CANADIAN WOOD PULP EXPORTS BY GRADES FOR SELECTED YEARS
('000 Tons)

Year	Total		Sulfate	Sulfite	Dissolving and Special		Mechanical	Other
	'000 tons	\$'000			Alpha			
1953	1,950	248,675	706	590	383		228	44
1957	2,283	292,406	1,016	691	275		248	53
1963	3,339	405,292	1,883	786	372		248	49
1967	4,269	543,433	2,966	724	317		221	7
1971	5,676	798,080	4,529	554	349		232	12
1972	6,102	817,331	4,988	517	312		275	11

SOURCE: Canadian Pulp and Paper Association,
Reference Tables, 1973, p. 11

imported in excess of this amount is subject to a 3 percent ad valorem tariff.

Table III-6 shows the quantities of kraft pulp exports by area for selected years. Although the absolute quantities of pulp exports going to the United States has grown steadily over the past 20 years, the proportion of total Canadian pulp exports going to the United States has declined. Canadian pulp producers are becoming less dependent on American markets and are sending proportionately more pulp to Europe, Great Britain, Japan, Asia and Latin America.

In summary, the most significant feature of the pulp market is that it consists of an extensive international trade in wood pulps under (relatively competitive market) conditions. Approximately 43 Canadian pulp producers currently supply about 37 percent of the world's pulp exports in competition with over 200 other companies primarily located in the United States, Norway, Finland and, to a growing extent, Russia. Moreover, there are no tariffs on wood pulp in Canada, the United States, Britain and some European countries. Prices of wood pulp are, therefore, determined in an international market over which pulp producers as well as customers in Canada have no control.

Canadian pulp producers export 88 percent of their total pulp shipments and upwards of 80 percent of this is kraft pulp. Only 25 percent of the wood pulp produced in

TABLE III - 6

SULFATE PULP EXPORTS, BY AREA

('000 tons)

<u>YEAR</u>	<u>TOTAL</u>	<u>UNITED STATES</u>	<u>LATIN AMERICA</u>	<u>UNITED KINGDOM</u>	<u>E.E.C.</u>	<u>JAPAN</u>	<u>OTHER ASIA</u>	<u>AFRICA</u>	<u>AUSTRALIA AND NEW ZEALAND</u>
1953	708	642	10	24	15	10	4	-	1
1957	1,016	875	12	45	37	30	9	-	8
1963	1,883	1,425	36	106	145	124	20	-	27
1967	2,996	1,924	53	171	454	263	36	12	54
1970	4,290	2,423	52	316	853	485	74	19	68
1971	4,529	2,553	85	295	1,051	346	104	15	80
1972	4,988	2,711	117	378	1,182	365	145	16	74
									108
									1

SOURCE: Canadian Pulp and Paper Association, Reference Tables, 1973 (Montreal: CPPA, February 1974)

Ontario is sold on the open market with 80 percent of this also consisting of kraft. The relevant market locations for Ontario pulp are the United States - east of the Mississippi, Britain, Europe and, to some extent, Latin America.

3. Newsprint Market

Newsprint is by far the dominant product of the Canadian and Ontario pulp and paper industries. Canadian mills produced about 9 million tons of newsprint in 1973, almost 70 percent of the total Canadian paper and paperboard production. Ontario accounted for about 21 percent of this production totalling 1.9 million tons in 1973. Newsprint output currently amounts to 47 percent of Ontario's total paper and paperboard production. Nearly 1.8 million tons of newsprint valued at \$241.7 million were shipped from Ontario plants in 1971. This was 47 percent of the total value of shipments for all paper products shipped in the province.⁸

Canada consumes only 8 percent of her total newsprint production, some 780,000 tons in 1972. The remainder, over 7.9 million tons, is exported. As with pulp, the United States and Great Britain charge no tariffs on Canadian newsprint. Members of the European Economic Community admit up to 625,000 metric tons of newsprint

⁸ Statistics Canada, Pulp and Paper Mills, 1971, page 13.

duty free per year. Imports of newsprint in excess of this amount are charged about 7 percent duty. Eighty percent of Canadian exports, 6.4 million tons in 1972, went to the United States where it comprised 64 percent of that nation's newsprint supply. Most of the remaining exports go to Britain, Europe or Latin America. Table III-7 indicates the amounts of newsprint exports consumed in each of these different markets during selected years.

Thanks to abundant wood resources and tariff-free trade with the U.S. in newsprint, the Canadian pulp and paper industry has, to a large extent, specialized in producing newsprint for the United States. The United States itself has a productive capacity of about 3.5 million tons per year but currently consumes over 10.3 million tons of newsprint annually. According to the R.A. Daly and Company, all but about 20 percent of newsprint production in Ontario is shipped to the midwestern United States.⁹ The remainder is, for the most part, sold to domestic publishers. While some Ontario newsprint production is sent to New York publishers, little or no Ontario newsprint is shipped to overseas markets. The

⁹ R.A. Daly and Company, "The Canadian Forest Products Industry" (Toronto: R.A. Daly and Co. Ltd., January 1969), pp. 24 - 25.

TABLE III-7

PRODUCTION, SHIPMENTS AND EXPORTS OF NEWSPRINT FOR SELECTED YEARS ('000 TONS)

YEAR	Total Production		Shipments		Exports			
	Canada	Ontario	to Canada	Exports	U.S.	U.K.	E.E.C.	Latin America Other
1953	5,721	1,298	398	5,334	4,861	190	4	158 120
1957	6,361.7	1,487	457	5,907	5,055	382	47	240 183
1963	6,630	1,567	523	6,622	5,180	442	40	245 193
1967	8,051	1,816	638	7,968	6,263	333	93	348 293
1970	8,607	1,858	716	8,592	6,144	400	153	637 542
1971	8,297	1,773	720	8,210	6,114	367	79	572 417
1972	8,661	1,783.6	780	8,740	6,403	484	79	541 452
1973	8,966.3	1,921.7	N/A	N/A	N/A	N/A	N/A	N/A N/A

SOURCE: Canadian Pulp and Paper Association
Reference Tables - 1973 (Montreal: CPPA, 1973) p.16

newsprint sector of the Ontario pulp and paper industry is, therefore, tied to the fortunes of the newspaper and publishing interests of the United States. The competitive structure of this market will be examined in greater detail in a later section.

4. Paper and Paperboard Markets

Table III-8 lists the primary categories of paper and paperboard products made and sold by the Canadian pulp and paper industry during 1971. It is significant to note that Ontario mills alone produce more than 55 percent of all the book and fine writing papers made in Canada. While fine paper production accounts for only 16 percent of the total paper output of Ontario, this sector earns 27 percent of the value of shipments or \$135.6 million in 1971. The three million tons of paper and paperboard products shipped from Ontario in 1971 were valued at \$510.8 million. Newsprint shipments alone accounted for 47 percent of this.

Paperboard accounts for over 20 percent of the total provincial paper product output, second only to newsprint. The value of paperboard shipments totalled \$91.3 million or 18 percent of the total value of shipments for Ontario in 1971. Wrapping papers shipped from Ontario during 1971 were valued at \$25 million while tissue and building papers yielded another \$16.8 million. These data are summarized in Table III-9.

TABLE III-8

PRODUCTION OF PAPER AND PAPERBOARD IN CANADA AND ONTARIO, 1971

	<u>CANADA</u>			<u>ONTARIO</u>	
	<u>000 Tons</u>	<u>% Total</u>	<u>000 Tons</u>	<u>% Canada</u>	<u>% Total Ontario</u>
Newsprint	8,524.2	62.3	1,773.0	20.8	56.9
Book, Printing, Writing Paper	930.5	7.1	513.6	55.2	16.5
Paperboard	1,871.3	14.2	638.0	34.1	20.5
Container Grade	797.4				
Corrugating Material	389.7				
Boxboard	685.0				
Wrapping Paper	540.2	4.1	77.4	14.3	2.5
Tissue					
Sanitary	269.3	2.2			
Other	20.1		116.4	26.7	3.7
Building Paper	147.0	1.1			
Total	<u>12,302.7</u>	<u>100</u>	<u>3,119.0</u>	<u>25.4</u>	<u>100</u>

SOURCE: Statistics Canada, Manufacturing and Primary Industries Division, Pulp and Paper Mills, 1971,

(Ottawa: Information Canada, 1973).

TABLE III-9

TOTAL VALUE OF SHIPMENTS FOR PULP AND PAPER
PRODUCTS FROM CANADA AND ONTARIO, 1971

\$000

	CANADA	ONTARIO
		N/A
Total Wood Pulp	878,132	
Sulfate	690,309	
Sulfite	95,690	
Groundwood	14,688	
Other	77,444	
Total Paper & Paperboard Products	1,751,847	510,764
Newsprint	1,083,225	241,702
Printing and Writing	241,810	135,546
Wrapping	115,391	25,354
Paperboard	268,280	91,332
Other	43,142	16,830

SOURCE: Statistics Canada, Manufacturing Prices and Primary Industry Division, Pulp and Paper Mills 1971, (Ottawa: Information Canada, 1973), pp. 11, 13.

While wood pulp and newsprint are produced for export with no tariff barriers in the United States or Britain, tissue, writing, wrapping and paperboard grades are all protected by duties and non-tariff barriers in most nations, including Canada. Consequently, there has been relatively little international trade in these products and Canadian producers have directed their output of writing papers, tissues and paperboard and wrapping papers primarily to domestic markets. Tariffs and duties on these products were lowered in 1969 as a result of the GATT or Kennedy Round tariff negotiations. The impacts of these tariff reductions and other relevant details concerning this sector will be taken up in a later section.

5. Location of Consumers

The United States is by far the primary market for Canadian market pulp and newsprint. One of Canada's chief comparative advantages for pulp and paper is its proximity to this vast market area. Of the 50 million tons of pulp consumed in the United States during 1972, 3.5 - 3.6 million tons, about 7 percent, were supplied by Canadian mills.¹⁰ Approximately 130,000 tons of the pulp used in the United States were imported from other countries, principally

¹⁰ Canadian Pulp and Paper Association, Reference Tables - 1973, page 27

Scandinavia. Over 64 percent of the 10 million tons of newsprint consumed in the United States during 1972 were supplied by Canadian mills. Eastern Canadian (Ontario and Quebec) paper manufacturers have also managed to increase their exports of fine papers and paperboard to the United States over the past 6 years.

Industry sources indicate that virtually all of Ontario's market pulp and newsprint exports are directed to customers in the midwestern and eastern United States.¹¹ While Great Britain, the European Economic Community, Latin America and Japan constitute growing markets for chemical pulp they are served by tide-water mills in Quebec, the Atlantic provinces and British Columbia. Indeed, Eastern Canadian producers, particularly those in Ontario, prefer to direct their newsprint sales to the United States where, despite competition, they believe they can get higher profits.¹² The newsprint and, to a lesser extent, the market pulp segments of the Ontario pulp and paper industry are inextricably linked to the United States' economy.

The current size of the U.S. market is further illustrated in Table III-10.

11

R.A. Daly and Co. Ltd., op. cit., January 1969, page 25

12

Report to the Ministers on Tri-Partite Meetings with Manufacturers of Newsprint in Ontario and Quebec, December 1972, page 6.

TABLE III-10

U.S. PULP AND PAPER PRODUCTION, CONSUMPTION,
IMPORTS AND EXPORTS, 1960, 1965 AND 1972

	<u>1 9 6 0</u>		<u>1 9 6 5</u>		<u>1 9 7 2</u>	
	(Pounds per (000 T) Capita)		(Pounds per (000 T) Capita)		(Pounds per (000 T) Capita)	
Wood Pulp	(1)					
Production, U.S.	25,316		33,993		43,946	
Imports	2,381		3,137		3,514	
Exports	1,142		1,402		2,175	
Consumption	25,700		34,006		43,611	
Newsprint						
Production	2,003		2,170		3,408	
Imports	5,410		6,323		7,101	
Exports	135		84		145	
Consumption	7,270	80.7	8,408	84.2	10,364	99.2
Paper						
Production	13,396		16,943		21,913	
Imports	164		208		456	
Exports	292		482		520	
Consumption	13,276		16,670		21,848	
Paperboard						
Production	5,676		20,834		28,637	
Imports	37		14		10	
Exports	563		1,178		2,358	
Consumption	15,150	167.7	19,670	202.5	26,289	251.8

(1) 1971 Figures for Wood Pulp only.

SOURCE: Pulp and Paper International - Review Number 1973
Vol. 15, No. 8, (July) 1973, pp. 113-117.

U.S. Bureau of the Census, Statistical Abstract of the
United States: 1972 (93rd edition) Washington, D.C.
1972, p. 633.

6. Major Pulp and Paper Producing Areas

The major pulp and paper producing countries are Canada, the United States, Sweden and Finland. Within Canada, pulp and paper production capacity is concentrated in Quebec, Ontario and British Columbia. A few large mills are also located in the Canadian Maritimes. Producers in all of these areas compete to different degrees with paper manufacturers in Ontario.

As a result of a common heritage and geographical proximity, the Quebec industry is similar to that in Ontario in many respects although it is somewhat larger.¹³ Almost 4 million tons of newsprint were produced in Quebec during 1972. This amounted to about 70 percent of the total paper and paperboard production in the province. Like Ontario, many of the newsprint mills in Quebec are old and are usually associated with sulfite pulping mills. About one million tons of market pulp are currently being shipped from Quebec each year. Nearly 77 percent of the newsprint produced in Quebec and 50 percent of the market pulp shipments from that province

13

In 1971, pulp production in Quebec totalled 6.2 million tons as against 3.8 million tons in Ontario. Furthermore, over 5.2 million tons of paper and paperboard products were produced in Quebec mills during that same year while 3 million tons were produced in Ontario. Statistics Canada, Pulp and Paper Mills, 1973, pp. 15, 17.

are sent to the United States.¹⁴ It would seem, therefore, that Quebec is a primary competitor in the U.S. pulp and newsprint markets with Ontario pulp and paper mills.

However, several factors mitigate the extent to which pulp and paper mills in Quebec actually compete against those in Ontario. First, Quebec producers sell their newsprint and market pulp primarily to customers located in the northeast and along the Atlantic coast of the United States, whereas Ontario directs its sales mainly to the Midwest.¹⁵ Quebec mills also ship some 700,000 tons of newsprint to Britain, Europe and South America.¹⁶ Secondly, much of the newsprint and pulp capacity in both Ontario and Quebec are owned by such companies as Abitibi and Domtar. Furthermore, most of the pulp and paper companies in Eastern Canada have interlocking directorships.

The other important producing area in Canada is British Columbia. Production here is predominantly sulfate market pulp and newsprint.¹⁷ Although some newsprint and pulp is shipped east to midwestern U.S. markets, the bulk

¹⁴ The Council of Pulp and Paper Producers of Quebec, The Competitive Position of the Quebec Pulp and Paper Industry. (Montreal: the Council of Pulp and Paper Producers of Quebec, January 1972), pp. 27, 33.

¹⁵ R.A. Daly and Co. Ltd., op. cit., January 1969, page 25

¹⁶ The Council of Pulp and Paper Producers of Quebec, op. cit. 1972, page 33.

¹⁷ Fifteen out of 21 mills in B.C. produce kraft market pulp.

of the output is sent to Western U.S. and Far Eastern markets. Shipping costs are not an important barrier in limiting the entry of western newsprint into eastern U.S. and Canadian markets. However, these eastern and western newsprint producers have long avoided attempting to enter each other's respective markets.¹⁸

The large forest reserves in the Southeastern United States have become, over the past three decades, the primary pulp and paper producing area in the United States. Mills in the region specialize in kraft pulping operations and newsprint capacity in the region has been steadily increasing. Approximately 75 percent of the paper and paperboard products used in the United States originate with Southern kraft pulping. Mills in the Northeastern and Great Lakes States have become specialized in writing and sanitary papers which are consumed in nearby markets.

Scandinavia accounts for about 70 percent of the pulp produced in Europe. Over 19.5 million tons of wood pulp were manufactured in Norway, Sweden and Finland during 1970, of which 7.5 million tons were exported. The Scandinavian countries also manufacture 50 percent of the

¹⁸ "For years an unofficial agreement has existed between eastern and western producers that neither will invade the territory of the other."

John A. Guthrie, The Newsprint Paper Industry (Cambridge, Massachusetts: Harvard University Press, 1941), page 205.

newsprint made in Europe each year. Some Scandinavian pulp and newsprint is sold to the United States but their markets are primarily Britain, Germany, and other E.E.C. countries. Canadian pulp and paper competes with the Scandinavian producers primarily in British and European markets. U.S. pulp and newsprint consumers prefer Canadian over Scandinavian products, even at a premium price, because the supply is more reliable.

In summary, not all of these principle producing areas are currently in direct competition with Ontario products. Western Canada primarily produces market kraft pulp and newsprint for the Western U.S. and Far East although some product from B.C. or Alberta may find its way to the midwest U.S. Scandinavian mills currently supply British and European markets with pulp and newsprint with very little going to the United States. The relevant competitors for Ontario are mills in Quebec and the southeastern United States although there are some factors which may well offset the competition between Ontario and Quebec mills.

Since a large proportion of Ontario's production is exported, the important question concerns how environmental policies will affect the competitive position of Ontario mills vis-a-vis other producing areas. This problem will be examined in detail in a later section.

D. CONDITIONS OF THE MARKETS

1. Introduction

The pulp and paper industry is a capital intensive manufacturing operation. A measure of this is the ratio of total assets to total wages of production workers. The more capital intensive the industry is, the higher this ratio is expected to be. As shown in Table III-11, this ratio is 12.4 for pulp and paper mills while it amounts to 6.8 for all manufacturing industries in Canada. By way of further comparison, the ratio for petroleum refining, a highly automated technology with a very small labour component, is 89.8. On the other hand, firms which manufacture boxes and bags have a ratio of 2.7. Construction, a very labour intensive industry, has a ratio of 0.6.

Because it is so capital intensive, the pulp and paper industry is susceptible to cycles of boom and bust. Plants have to pay high fixed costs at whatever level of output they are operating. Hence, the more they can produce, the lower are their fixed costs per unit of output. As long as the output of an individual mill has no effect on the prices of paper products, or at least as long as mill managers perceive that their output has no effect, each mill has the incentive to maintain as high a level of production as possible. Indeed, the so-called break-even

TABLE III - 11

COMPARISON OF THE RATIO OF ASSETS TO WAGES OF
PRODUCTION WORKERS IN PULP AND PAPER MILLS AND
SELECTED INDUSTRIAL SECTORS, 1969

	\$000,000		
	<u>Total Assets</u>	<u>Total Wages of Production Workers</u>	<u>Ratio Assets to Wages</u>
Pulp & Paper Mills	6,150.7	496.2	12.4
Petroleum Refining	5,408.2	60.2	89.8
Paper Boxes & Bags	267.7	99.5	2.7
Building Contractors	2,121.5	3,604.9	.6
Total Manufacturing	46,878.8	6,921.5	6.8

Source: Statistics Canada, Corporation Financial Statistics, 1970
(Ottawa: Information Canada, June, 1973).

ratio for pulp and paper mills is currently over 80 percent.¹⁹ This means that in order to pay all fixed and variable costs and make a profit, the mill must produce at 80 percent or more of its capacity.

During periods of growing demand, firms expand their capacity. This new production capacity is added in discrete units so that total capacity may exceed demand when initially installed. Since all mills have a compelling incentive to produce at full capacity, excess production may result or be exacerbated when demand for paper and pulp slackens. Firms will be unable to pass on cost increases in rising prices. Producers may even give price discounts in order to keep their plant running at full capacity. Profits decline and marginal facilities are forced to close down. Demand growth catches up to capacity, prices start to rise again and the industry goes into another boom period.

This process has certainly occurred in the Canadian and Ontario pulp and paper industry. Some of the indicators which illustrate this process are presented in Figures III-1 through III-5. Note in Figures III-1 and III-2, there were

¹⁹ Report to Ministers on Tri-Partite Meetings with Manufacturers of Newsprint in Ontario and Quebec, December 1972, page 6.

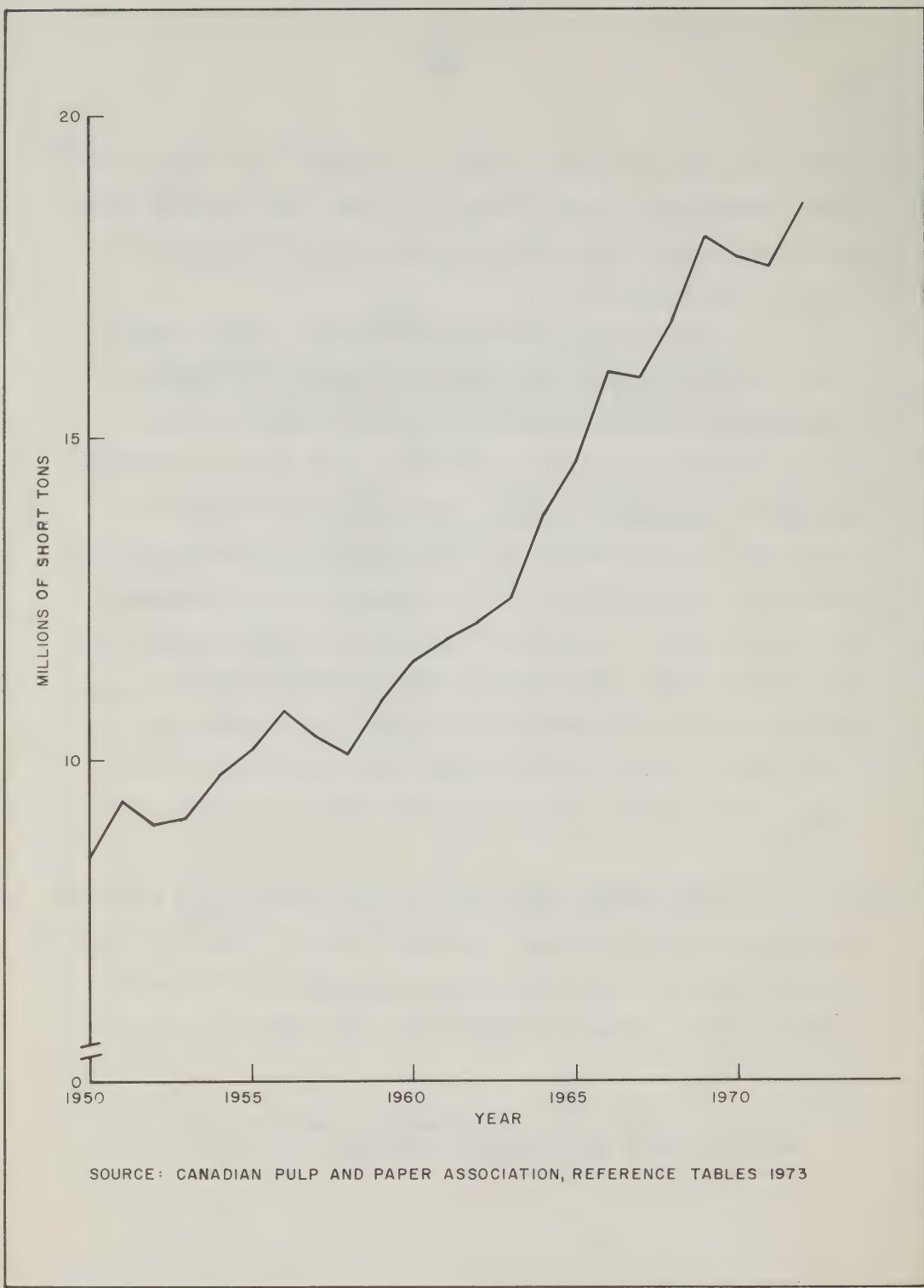
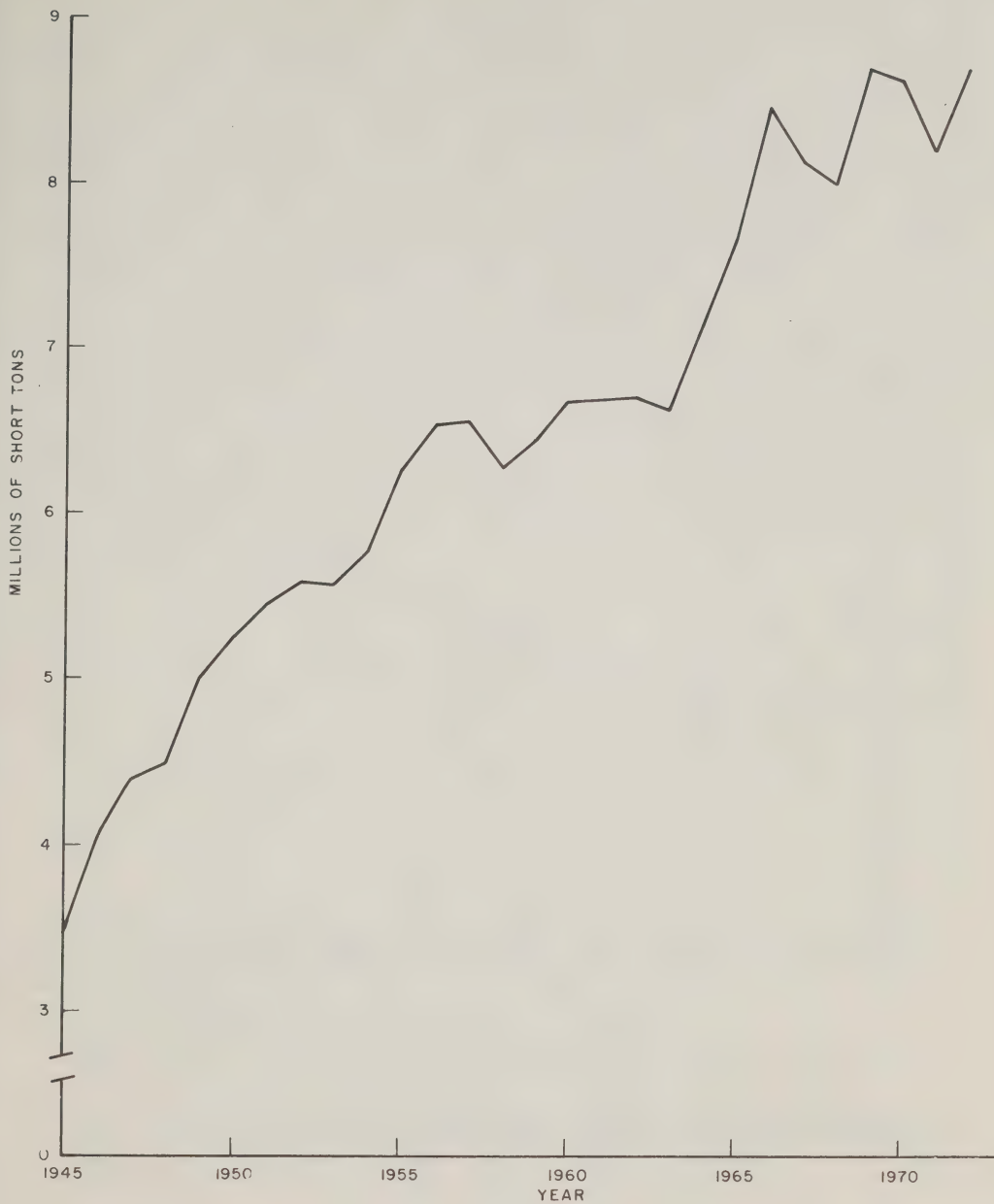
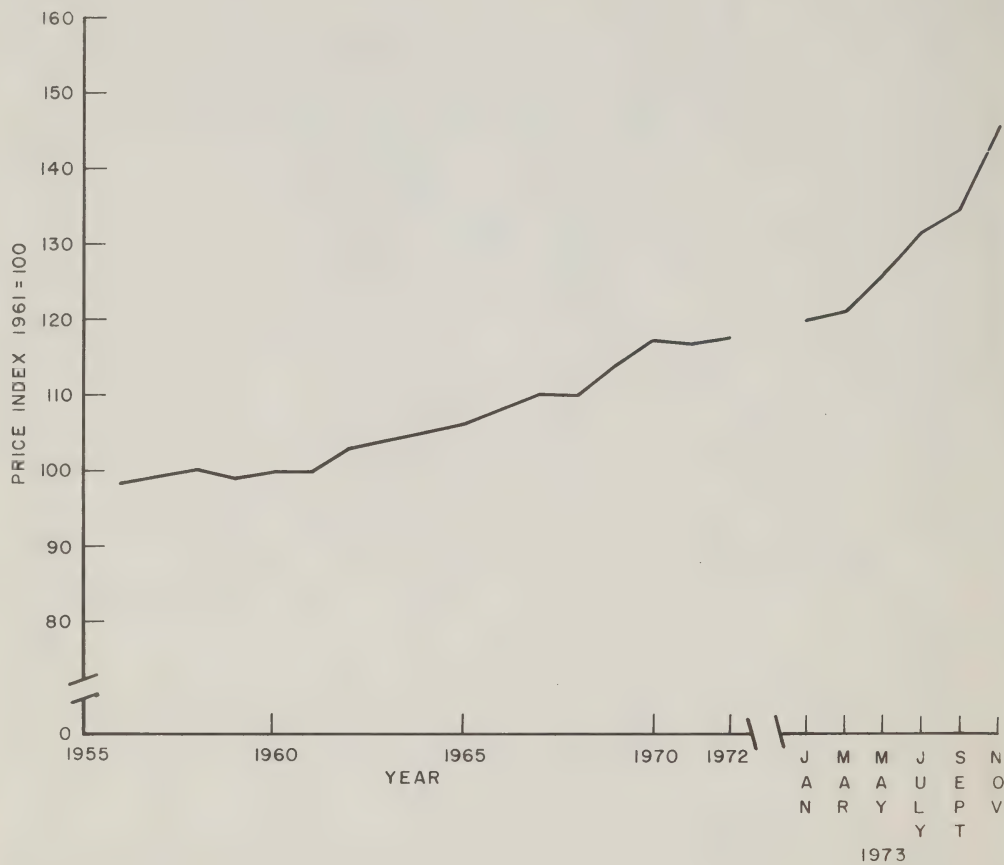


FIG. III - I TOTAL WOODPULP PRODUCTION - CANADA 1950 - 1971



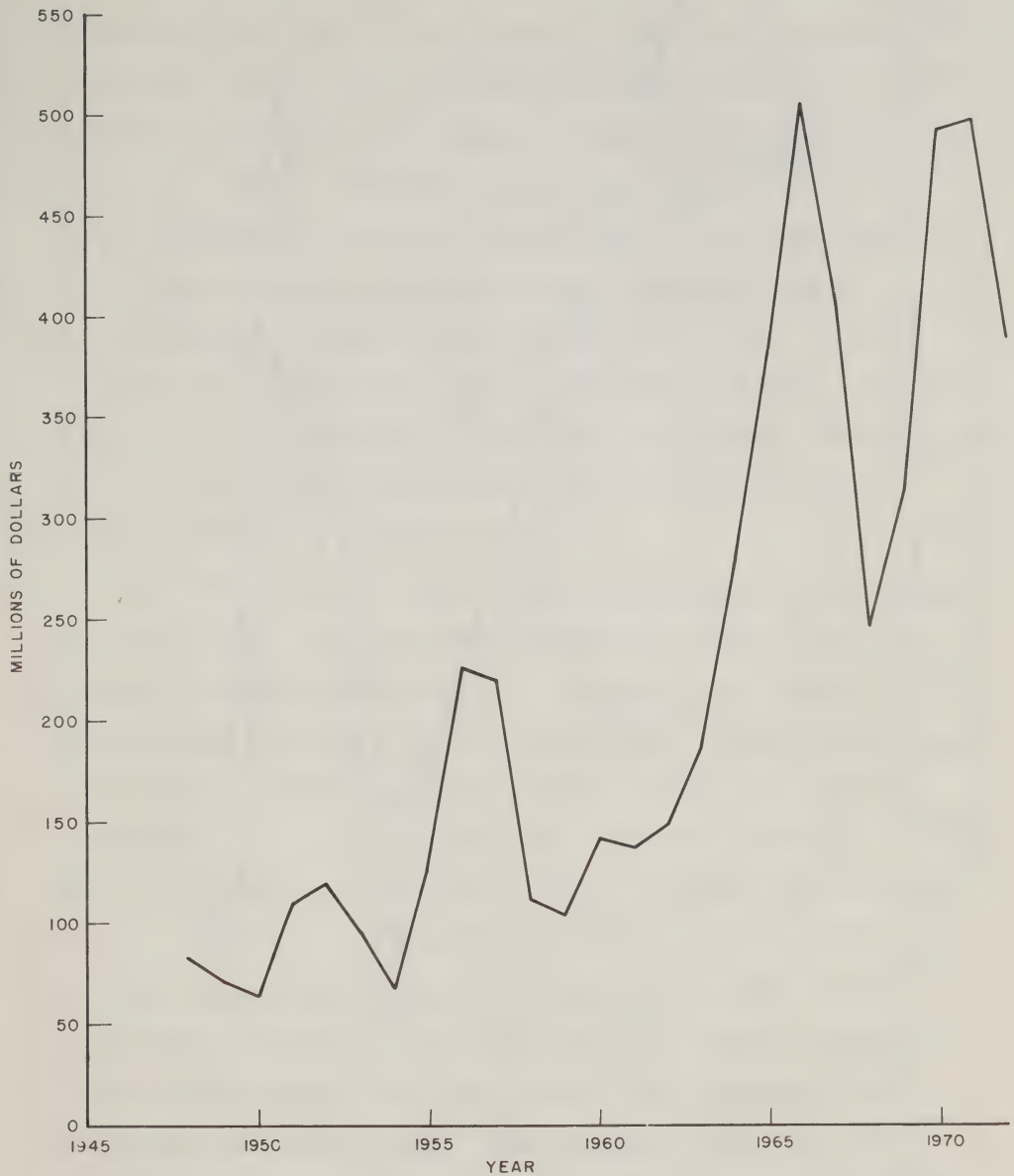
SOURCE: CANADIAN PULP AND PAPER ASSOCIATION, REFERENCE TABLES 1973

FIG. III - 2 NEWSPRINT PRODUCTION - CANADA 1945 - 1972



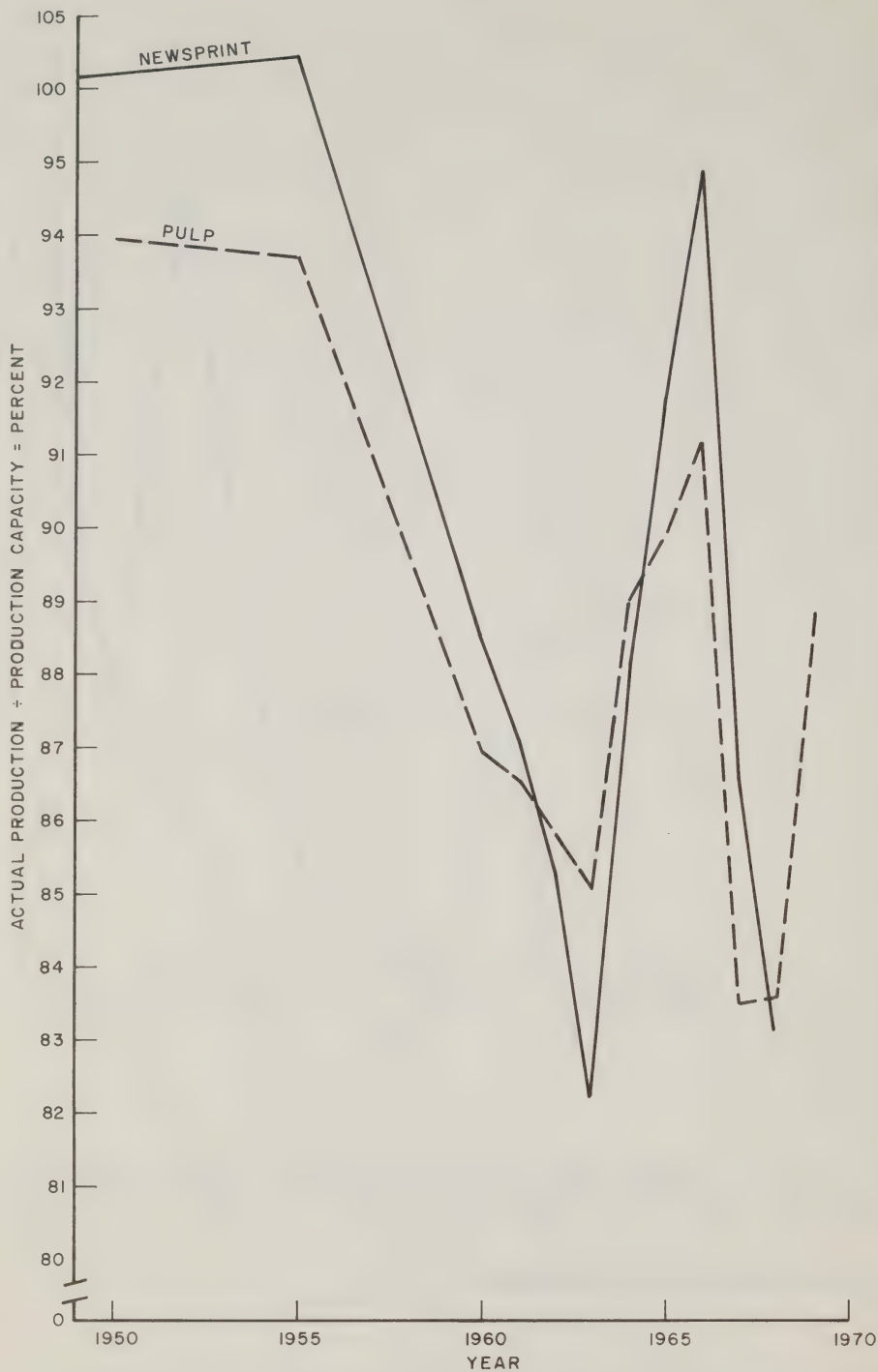
SOURCE: STATISTICS CANADA, PRICES AND PRICE INDEXES

FIG. III - 3: WHOLESALE PRICE INDEX - CANADA PULP AND PAPER MILLS



SOURCE: STATISTICS CANADA, PULP AND PAPER MILLS

FIG. III - 4 ESTIMATED CAPITAL EXPENDITURE FOR THE CANADIAN PULP AND PAPER INDUSTRY



SOURCE: CANADIAN PULP AND PAPER ASSOCIATION, REFERENCE TABLES 1973

FIG. III - 5 OPERATING RATIOS PULP AND NEWSPRINT

pronounced declines in the growth of pulp and newsprint production during five different periods: 1951-1953, 1956-1958, 1960-1963 (for newsprint only), 1967 and 1970. Assuming a year's leadtime for capital expenditure plans, it is clear, when comparing Figures III-3, III-4 and III-5, that commitments were made during the years of rapidly growing demand and production, 1951, 1955-56 and 1963-66. The capital expenditures made in 1970 and 1971 were likely a result of the relatively good years the industry experienced in 1968 and 1969 and expectations resulting from rising prices during 1968 through 1970.

The various other indicators coincide nicely for the years, 1961 and 1967, when production of both pulp and newsprint had slackened off. A combined price index for all products sold by pulp and paper mills, illustrated in Figure III-3, remained steady in both years. New capital investment was at a relatively low level and operating ratios for pulp and newsprint had also dropped significantly.

The data in these Figures also show that the industry has just come out of its latest, rather severe, slump which occurred during 1970 and 1971. Pulp and newsprint production in Canada and Ontario had dropped from previous highs set in 1969. The selling price index for pulp and paper mills levelled off after a 7-percent increase between 1968 and 1970. Operating ratios for pulp and news-

print in Canadian mills averaged 83 to 84 percent and net profits as a percent of capital invested dropped to 2.4 percent in 1970 from 4.2 percent in 1969. The trade literature and the annual reports of various firms were filled with tales of woe. According to the Ministry of Treasury, Economics & Intergovernmental Affairs, several kraft pulp mills in Ontario were on the verge of closing.²⁰

At this writing, pulp and paper markets have completely recovered. Production of all grades of pulp during 1973 was 6 percent ahead of 1972. Total shipments of all paper and paperboard products during 1972 were 7.5 percent over 1971. Prices of all pulp and paper products rose rapidly during 1973. For example, the price index for pulp and paper mills jumped by 25 percent between January and December 1973, while prices of bleached kraft pulp increased by 50 percent over the same period. Operating ratios for all products have exceeded 90 percent during 1973 with paperboard mills achieving 100 percent in some months. Profits are also recovering. Table III-12 shows that profits for the first three quarters of 1973 are up substantially for four Canadian-owned firms which operate 15 of the 34 pulp and paper mills located in Ontario.

²⁰ Economic Planning Branch, Ministry of Treasury, Economics and Intergovernmental Affairs "Preliminary Report on Economic Policy Problems in the Ontario Pulp and Paper Industry", mimeo, Sept. 1972, p. 4.

TABLE III - 12

PROFIT RATIOS FOR SELECTED PULP AND
PAPER COMPANIES OPERATING IN ONTARIO

RATIO A: Profits after taxes and extraordinary items as a percent of capital employed⁽¹⁾.

RATIO B: Profits before taxes as a percent of income from sales.

<u>COMPANY</u>	<u>RATIO</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u> <u>(9 months)</u>
Abitibi	A	3.6	1.3	1.4	2.4	
	B	8.5	3.4	2.0	3.9	5.9
Anglo-Canadian	A			2.5	2.6	
	B			3.6	3.8	13.5
Domtar	A			.4	3.0	
	B			3.9	5.9	9.0
Great Lakes	A	6.2	6.5	4.4	2.1	
	B	12.9	10.7	7.0	3.6	7.1
Kimberly Clark	A		4.6	loss	6.8	
	B		7.2	loss	10.8	

(1) Capital employed is equal to the total liabilities and equity of the firm less total current liabilities. See Statistics Canada, Corporation Financial Statistics, 1970 Catalogue 61-207 (Annual) (Ottawa: Statistics Canada, 1973), p. 252

Source: Annual reports of Companies

Long-run growth of paper and paperboard products depends primarily on population and income.²¹ Rising incomes, in particular, are associated with a rising per capita consumption of paper.²² While the world-wide demand for paper is expected to continue its long-term growth, particularly in areas of relatively low incomes, the industry is vulnerable to rather severe business cycles in the high income, industrial countries. Here the demand for paper products and pulp has been shown to be sensitive to the overall level of economic activity.²³

Newsprint is especially responsive to business cycles.²⁴ The amount of newsprint consumed depends largely on the amount of newspaper advertising that is demanded, and secondarily on newspaper readership patterns. Newspaper advertising is one of the first costs to be curtailed during a business recession. Hence, the demand for newsprint tends to fluctuate with business cycles.

²¹ Food and Agriculture Organization, World Demand for Paper to 1975 (Rome: FAO, UN, 1960)

²² Ibid, page 26.

²³ Dwight Hair, Use of Regression Equations for Projecting Trends in Demand for Paper and Board (Washington, D.C.: U.S. Department of Agriculture, December 1967), pp. 9 - 11.

²⁴ For more detailed analyses of the demand for newsprint see: John A. Guthrie, op.cit., 1941. & Muhammed N. Islam, "Interregional Competition and Comparative Location Advantages of the N.A. Newsprint Industry" (unpublished PhD Dissertation) McGill University 1973.

It is not known whether the current boom will precipitate the pattern of expansion, over-production, price discounting and profit erosion described earlier. In addition, an economic slow-down in the United States, northern Europe or even Canada itself could occasion a recession in the pulp and paper industry again, but one which is not of the industry's own making. On the other hand, some observers believe that the days of excess capacity and weak markets may be over for two reasons. In the first place, there are indications that available timber for pulp wood is becoming scarce relative to the total consumption of pulp and paper products. The Ontario Ministry of Natural Resources is in the process of trying to determine whether Ontario forests could support any new paper mills. A possible fibre scarcity may well be a limiting factor in the expansion of new pulp capacity. Secondly, firms may be better able to forecast market growth and adjust their expansion plans accordingly.

In the sections to follow, the condition of each major market category will be examined in depth. This will include a review of the secular trends in production and prices, an examination of the determinants of demand for the product group, a look at current market conditions and a discussion of the outlook for the product group over the next 18 to 36 months.

2. Market Pulp

The data presented in Table III-4 show that almost 90 percent of the pulp shipped from Ontario mills is sulfate or kraft market pulp. Virtually all of this is bleached and is exported to the United States. The remainder of the market pulps shipped from Ontario are approximately equal amounts of sulfite and groundwood. The kraft pulp market is of particular significance to this study because five of the six Ontario mills which were identified as being financially unable to satisfy provincial pollution control requirements are market kraft mills.²⁵ Table III-13 lists the mills in Ontario which produce market pulp. The following discussion will focus on the past and future performance of this market.

World demand and consumption of sulfate pulp has been growing steadily for the past two decades. This growth has been especially healthy in the United States where it has averaged 7 percent per year since 1950.²⁶ Since the United States is the principle market for Ontario market

²⁵ Economic Planning Branch, Ministry of Treasury, Economics & Intergovernmental Affairs. op. cit., September 1972, p. 4

²⁶ U.S. pulp production and consumption grew steadily through the period 1969-1972.

TABLE III - 13

MILLS WHICH PRODUCE MARKET PULP IN ONTARIO

COMPANY	MILL LOCATION	PRODUCTS	AVERAGE MARKET PULP PRODUCED-TONS/DAY
Abitibi	Smooth Rock Falls	Sulfate bleached soft- wood unbleached semi-bleached	325
American Can of Canada	Marathon *	Sulfate bleached hard- wood bleached soft- wood semi-bleached	500
Anglo-Canadian	Dryden *	Sulfate bleached hard- wood bleached soft- wood unbleached semi-bleached	430
Canadian Inter- national Paper	Hawkesbury *	Dissolving sulfite	270
Eddy Forest Products	Espanola *	Sulfate bleached hard- wood bleached soft- wood unbleached semi-bleached	650
Great Lakes	Thunder Bay	Sulfate bleached soft- wood semi-bleached Sulfite unbleached	600 60

* Mills identified by TEIGA as being in financial difficulties during March 1972.

Continued...

TABLE III - 13 (CONTINUED)

<u>COMPANY</u>	<u>MILL LOCATION</u>	<u>PRODUCTS</u>	<u>AVERAGE MARKET PULP PRODUCED - TONS/DAY</u>
Kimberly-Clark	Terrace Bay*	Sulfate bleached	410
Ontario-Minnesota Pulp and Paper Co.	Fort Frances	Sulfate bleached softwood semi-bleached	186
Ontario Paper Co. Ltd.	Thorold	Sulfite unbleached	100
Spruce Falls Power and Paper Co.	Kapuskasing	Sulfite bleached unbleached	200

* Mills identified by TEIGA as being in financial difficulties during 1972.

SOURCE: Pulp and Paper International - Review Number 1973,
25 July 1973, Vol. 15, No. 8. p. 48.

Lockwood's Directory of the Paper and Allied Trades,
96th Edition 1971/2

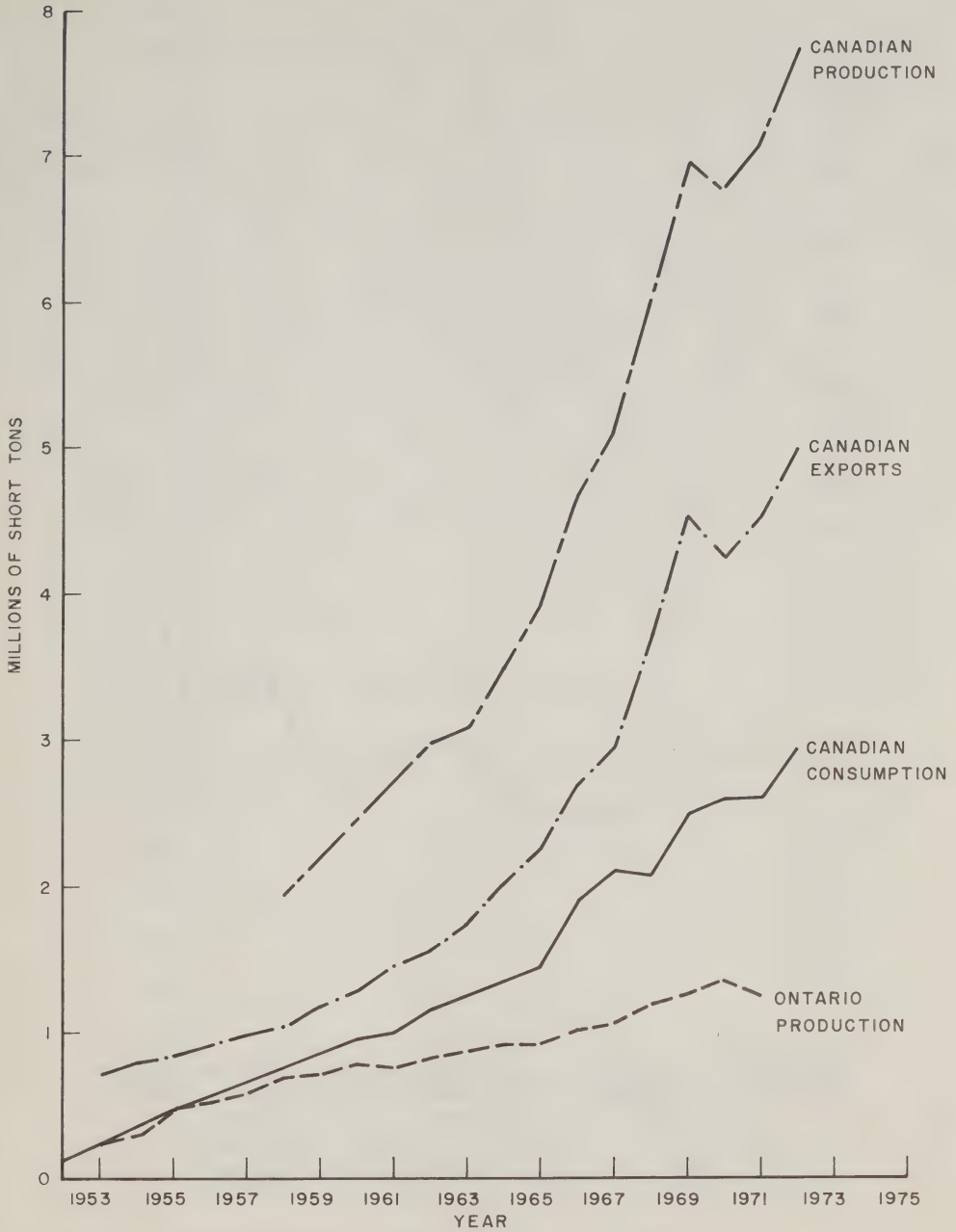
pulp, why did kraft pulp mills experienced financial difficulty during 1970-1972? An explanation for this apparent inconsistency depends on three factors: the growth of sulfate pulp production capacity in Canada and the United States relative to total demand; the relationship of Ontario sulfate pulp producers to the total North American supply structure and the technical constraints on the propensity of pulp producers to respond to short-run demand fluctuations.

Sulfate pulp capacity expanded rapidly during the first half of the 1960's, particularly in the Southeastern United States and in British Columbia. Much of this capacity expansion took the form of whole new mills. Kraft pulp production capacity thus grew in discrete jumps, sometimes to levels in excess of current demand and consumption of this commodity. Where this growth in capacity took place in the United States, the additional pulp production by U.S. mills often displaced Canadian market pulp. Moreover, many U.S. companies are producing a greater proportion of their own sulfate pulp requirements. To the extent these trends occurred, the demand for Canadian and Ontario market kraft pulp declined. Ontario kraft pulp mills produce sulfate market pulp in excess of the requirements of Ontario paper mills and so are quite vulnerable to shifts in market demand.

The data indicate that new kraft pulp capacity in the United States actually did displace markets formerly served by Canadian exports of market pulp. As illustrated in Figure III-6, Canadian production and exports of sulfate pulp declined in 1970 after a seven-year period of uninterrupted growth. On the other hand, sulfate pulp production in the U.S. rose by 3 per cent in 1970 from 28,609,000 to 29,473,000 tons. The resumption in the growth of sulfate pulp production was stimulated in part by an 11 per cent rise in Canadian pulp demand between 1971 and 1972.

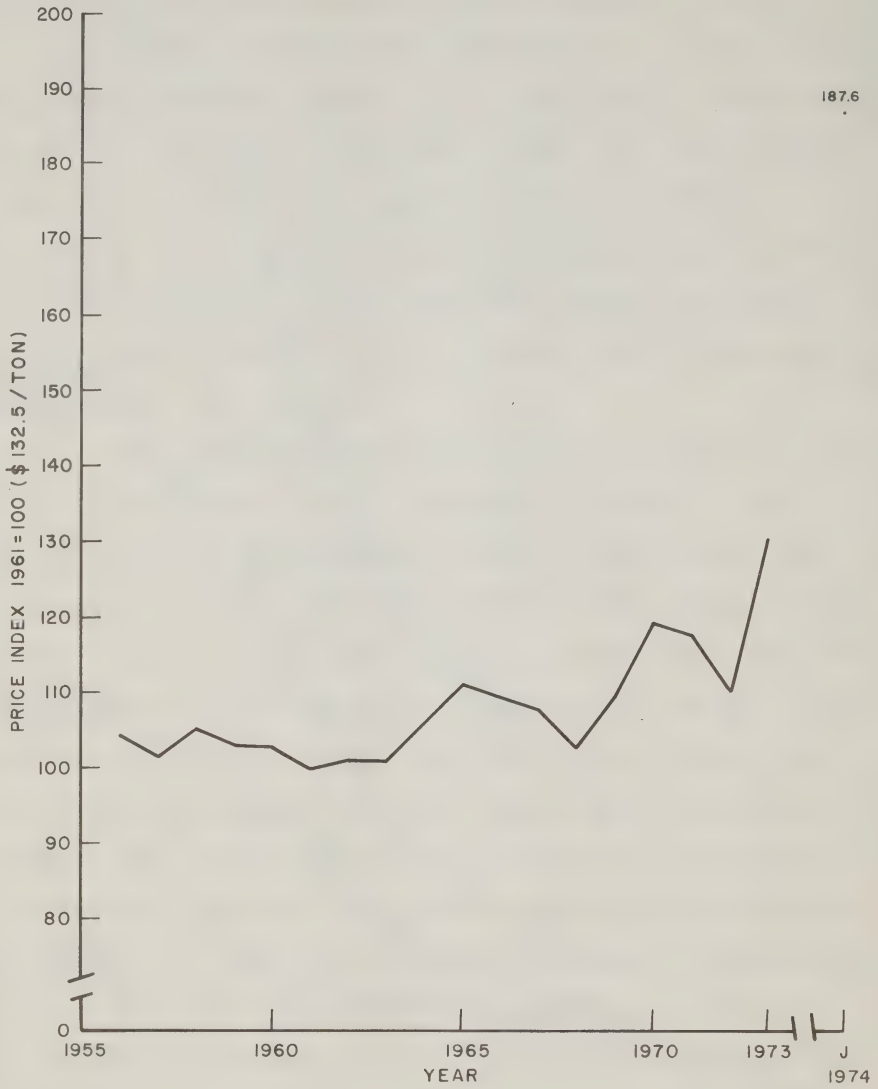
Kraft pulp producers are also constrained in their ability to respond to short-run shifts in demand. Once a kraft pulp mill is established, it can do little more than produce sulfate pulp. The fixed costs of the equipment are very high relative to variable costs of production and must be paid regardless of how much pulp is being produced. Thus, the greater the output of the mill, the lower will be the fixed, hence, the total, costs per ton of pulp produced. Therefore, when demand for kraft pulp declines, mills have an incentive to continue producing as much pulp as possible and to sell it by lowering prices if necessary. Consequently, short-run shifts in demand for sulfate pulp tend to be compensated for by fluctuations in prices rather than production.

The crux of the problem for market kraft pulp mills is illustrated in Figures III-6, III-7, and III-8. Canadian and Ontario production of sulfate pulp rose steadily through 1969, reflecting the expansion of capacity



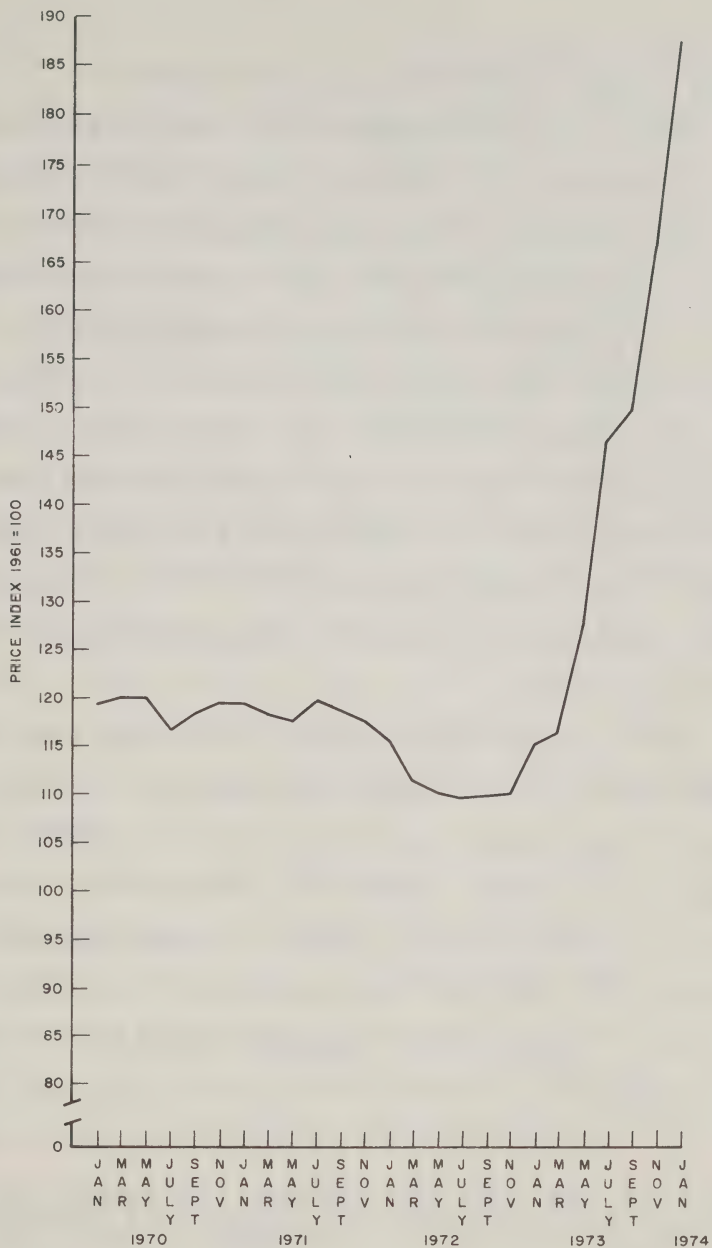
SOURCE: CANADIAN PULP AND PAPER ASSOCIATION, REFERENCE TABLES 1973 (CANADIAN PRODUCTION)
STATISTICS CANADA, PULP AND PAPER MILLS (ALL OTHER PLOTS)

FIG. III - 6 SULFATE PULP - PRODUCTION AND CONSUMPTION



SOURCE: STATISTICS CANADA, PRICES AND PRICE INDEXES

FIG. III -7 EXPORT PRICE INDEX - BLEACHED KRAFT - ANNUAL



SOURCE: STATISTICS CANADA, PRICES AND PRICE INDEXES

FIG. III-8 EXPORT PRICE INDEX-BLEACHED KRAFT PULP
-MONTHLY

during the 20-year period covered by the graph.

Prices fluctuated considerably over the same period, as shown in Figure III-7. Falling prices from 1965 through 1968 were due primarily to expanding capacity relative to demand. By 1968, prices began to grow as demand approached capacity. High prices occurred simultaneously with an overall production decline in 1970 followed by a decline of almost 10 percent between 1971 and 1972. Monthly prices and price index data shown in Figure III-8 indicate that prices of market kraft pulp declined to a low point during the months of May through December 1972. It was during 1972 that market kraft mills in Ontario experienced most of their financial difficulties.

While production and exports of sulfate pulp in Canada continued to grow through 1971 and 1972, Canadian mills had to grant price discounts in order to maintain their presence in the U.S. market.²⁷ Canadian pulp manufacturers were able to sustain growth in production and sales through 1971 and 1972 but experienced a cost-price squeeze (i.e., a profitability squeeze) during most of this two-year period.

²⁷ Until 1973, the price of kraft pulp from Canada was routinely discounted below the price of U.S. produced pulp. See:

R.A. Daly Ltd. The Canadian Forest Products Industry (Toronto: R.A. Daly Ltd., January 1969), page 42.

By the end of 1973, Canadian pulp production had risen 8 percent over 1972, almost double the average annual production increase for the years 1967-72.²⁸ The rapidly growing demand for kraft pulp is vividly reflected in the 51 percent rise in sulfate pulp export prices during 1973. This unprecedented price climb was due in part to Phase IV price controls in the United States. The price of domestically produced pulp in the United States had been frozen during 1973. Much of the kraft pulp produced in the United States was directed into firms' own integrated paper-making operations. Non-integrated U.S. paper and board-makers were forced to rely more and more on world pulp suppliers at rapidly rising prices. Some two thirds of the market pulp traded in the United States is currently of foreign origin. Price controls on pulp and paper in the U.S. were lifted in April 1974.

The outlook for chemical market pulps, especially Canadian sulfate grades, over the next 18 to 36 months is exceedingly good. Paper and board output may be increased considerably by speeding up machines or altering production schedules and product characteristics. However, there is little that can be done to existing pulp digesters and

²⁸ See Data in Appendix D

driers to increase capacity in the short-run and it takes 24 to 36 months to get a new pulp mill on line. Due in part to the two-year price freeze in the United States, no new pulp mills are under construction there. The U.S. industry is, however, increasing its paper and paperboard capacity by lengthening runs, speeding up machines and making higher grades.²⁹

Canadian sulfate market pulp capacity is expected to rise by 6.7 percent per year through 1975.³⁰ At this rate, there will be about 10.6 million tons of bleached and unbleached sulfate pulp capacity in Canada by 1975, of which about 6,487,000 tons will be market pulp.³¹ Based on the growth of sulfate pulp shipments since 1970, this projected capacity will barely offset normal market growth plus the 340,000 ton shortfall of fibre expected in the United States.

By the end of 1973, stocks of market pulp and waste paper for pulping held by U.S. producers and pulp buyers were low relative to levels of the previous year. Producers and buyers alike have turned to Canadian suppliers in order to build up stocks. Finally, overseas demand for market pulp promises to continue its substantial growth through

29 Ronald J. Slinn, "Current Trends in Market Pulp - Significance of COLC Easement", Paper Trade Journal, April 1, 1974, pp. 24-25.

30 Canadian Pulp and Paper Association, Canadian Pulp and Paper Industry, Capacity Survey - 1972-1975 (Montreal CPPA, Apr. 1973), page 5.

31 Ibid

1974. Japan increased its imports of Canadian pulp in 1973 by 51 percent over 1972.³² Exports to Western Europe rose by 11 percent during the same period.³³

Demand is expected to remain strong, especially over the next 12 to 18 months. It is unlikely that prices will fall during the next 6 to 12 months unless some hitherto unexpected new pulping capacity comes on line in Europe or North America. There are some uncertainties as to whether fuel shortages will precipitate a recession in the United States and Europe. So far, however, the fuel situation seems to have little effect on the demand for pulp and paper.

3. Newsprint

Approximately 80 percent of Canada's newsprint production is shipped to the United States where it accounts for about 64 percent of that nation's newsprint consumption. While newsprint is the "bread and butter" product of the eastern Canadian pulp and paper industry, the performance of this product market has been rather disappointing over the past five years. The data presented in Table III-14 and Figure III-9 indicate that newsprint consumption in the United States and sales by Canadian mills (Canadian Shipments and Exports) experienced a slump between 1969

³² Anonymous, "Canadian Industry Sets New Production Records Last Year", Paper Trade Journal, February 25, 1974, page 20.

³³ Ibid

TABLE III - 14

PRODUCTION AND CONSUMPTION OF NEWSPRINT IN CANADA
AND THE UNITED STATES

Year	<u>Canadian Shipments</u>		<u>Exports</u>		% (U.S. Supply)	<u>U.S. Consumption</u>		U.S. Shipments To U.S.
	Total 000 Tons	Canada Tons	Total 000 Tons	U.S. Tons		Total 000 Tons	Per Capita	
1973						10,500		
1972	8,740	780	7,960	6,403	64	10,271	98.4	3,315
1971	8,210	720	7,490	6,114	64	9,601	92.8	3,127
1970	8,592	716	7,876	6,144	64	9,545	93.2	3,162
1969	8,741	708	8,033	6,417	65	9,741	95.9	3,116
1968	8,096	674	7,422	6,107	66	9,244	91.9	2,835
1967	7,968	638	7,330	6,263	69	9,149	91.9	2,523
1966	8,385	620	7,764	6,610	72	9,077	92.2	2,339
1965	7,747	590	7,157	6,093	72	8,460	87.0	2,118
1964	7,310	550	6,759	5,648		8,042	83.7	2,170
1963	6,622	523	6,100	5,180		7,547	79.8	2,099
1962	6,680	511	6,169	5,229		7,486	80.3	2,086
1961	6,707	492	6,216	5,227		7,380	80.4	1,965
1960	6,752	487	6,265	5,279		7,426	82.2	1,954

SOURCE: Canadian Pulp and Paper Association, Reference Tables
1973 (27th Edition) Montreal: CPPA, Sept. 1973.



SOURCE: CANADIAN PULP AND PAPER ASSOCIATION, REFERENCE TABLES 1973

FIG. III - 9 NEWSPRINT CANADIAN PRODUCTION AND EXPORTS -
US CONSUMPTION

and 1972. It appears, however, that this market is recovering with U.S. newsprint consumption totalling about 10.5 million tons in 1973, a 2.2 percent gain over 1972.³⁴ It has been estimated that total newsprint consumption for 1973 would have increased by more than 5 percent if strikes in the Canadian railroads and newsprint mills had not caused supply shortages.³⁵

Several trends in this market should be noted. First of all, although Canadian mills continue to be the major source of newsprint for the U.S., the proportion supplied by Canada has been falling. (See Table III-14) While consumption of newsprint in the United States has grown by 35 percent since 1962, Canadian shipments to the U.S. has increased by only 22 percent between 1962 and 1974. Mills in eastern Canada increased their shipments to U.S. newspapers by only 17 percent during this same period.³⁶

A second trend is that growth in newsprint consumption and production has been slow relative to other

³⁴ Jon G. Udell, "Supply and Demand for Newsprint in the U.S. Current and Future", Paper Trade Journal, January 21, 1974, page 28.

³⁵ Ibid

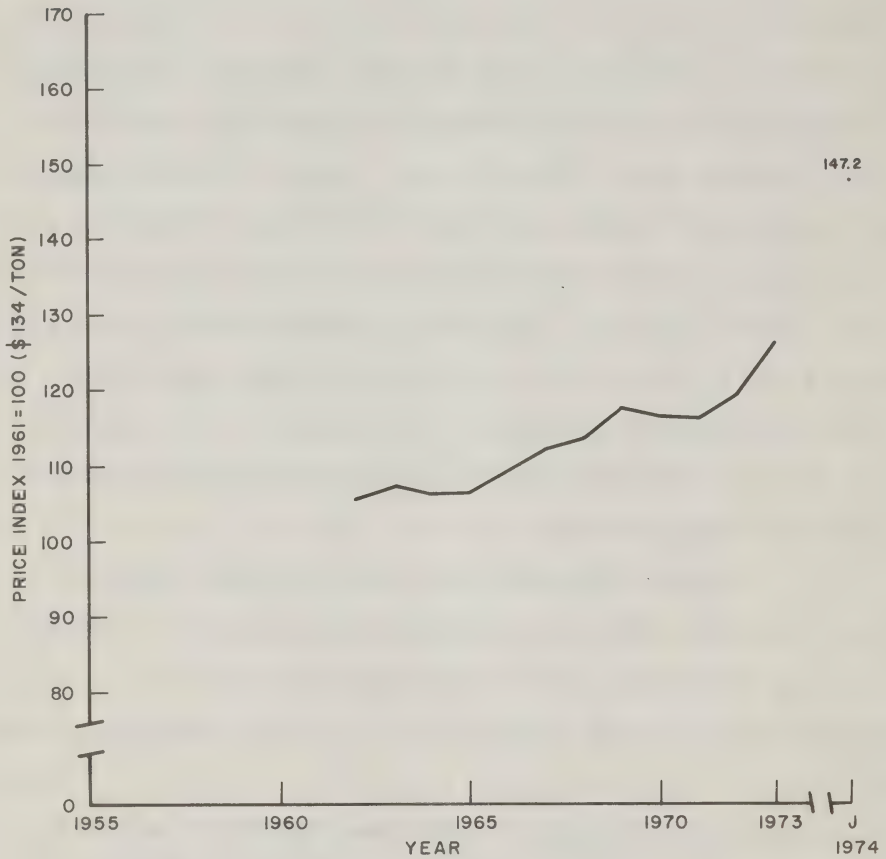
³⁶ Ibid

markets, averaging only 2 or 3 percent per year. Newsprint demand is derived from the demand for newspapers and for advertising. The newspaper market is relatively saturated and grows more or less in proportion to population.

Finally, comparing Figures III-9 and III-10, it is apparent that Canadian newsprint production has fluctuated rather widely over the past 20 years while prices, on the average, have been stable or rising during the same time period. Although fluctuations in this market are due initially to shifts in demand by publishers, newsprint producers are able to vary their output by speeding up or slowing down paper machines. In contrast to the pulp market, newsprint production has fluctuated while prices have held relatively stable.

Further evidence that Canadian pulp and paper mills actually cut back on output when demand was soft is found in the changes in average operating ratios. In 1969, Canadian paper mills recorded their highest newsprint production to date, the operating ratio averaged 91.1 percent.³⁷ Newsprint production fell by 250,000 tons in 1970 and operating ratios dropped to 88.6 percent. This was followed in 1971 by another 380,000 ton decline with operating ratios falling to 82.6 percent. The operating rate rose to 86 percent

³⁷ CPPA, Reference Tables, 1973, page 16.



SOURCE: STATISTICS CANADA, PRICES AND PRICE INDEXES

FIG. III - 10 EXPORT PRICE INDEX - NEWSPRINT - ANNUAL

in 1972 as Canadian newsprint production climbed to the 8.7 million ton level of 1969. Operating ratios vary considerably from firm to firm as is indicated in Table III-15. This Table distinguishes paper companies by ownership and indicates those operating in Ontario while Table III-16 lists the size and locations of the actual Ontario mills owned by these companies. It appears that firms operating in Ontario registered relatively low ratios over the period 1970 - 1972.

During the period 1970 to 1972, exports to Europe, Britain and Latin America did not offset the decline in sales to the U.S.³⁸ This corroborates the opinion of some eastern Canadian paper industry executives that "little, if any, continuing and profitable growth ..." is "... foreseen in offshore markets for eastern Canadian producers ..."³⁹ According to these same sources, sales to the U.S. market are, despite competition, more profitable.

The newsprint market began to recover in mid 1972 and by mid 1973, shortages were apparent. At the end of 1972, U.S. newsprint makers were producing at capacity.

38 Ibid.

39 Report to Ministers on Tri-Partite meetings with manufacturers of newsprint in Ontario and Quebec, 1973, page 6.

TABLE III - 15

OPERATING RATIOS OF INDIVIDUAL FIRMS WHICH OPERATE
NEWSPRINT MILLS IN EASTERN CANADA

Company	Production Capacity		
	1970	1971	1972
Under Foreign Producer Control or Ownership			
Anglo-Canadian ⁽¹⁾	90.2	95.5	99.1
Beaver Wood Fibre ⁽¹⁾	92.2	100	102
Bowaters Canadian	91.7	74.5	70
CIP	86	76.3	82.1
Crown Zellerbach	85.4	80.9	94.6
Nova Scotia Pulp	-	82.9	64.9
Ontario-Minnesota ⁽¹⁾	92.7	93.8	94.4
Under Foreign Publisher's Influence or Ownership			
Donohue	95.1	95.2	97.9
Ontario Paper ⁽¹⁾	90.9	86.2	87.9
Spruce Falls ⁽¹⁾	82.8	79.5	85.4
Under Canadian Ownership			
Abitibi ⁽¹⁾	79.8	76.4	74.3
B.C. Forest Products	76.1	91.7	91.2
Consolidated-Bathurst	82	78.7	90.7
Domtar ⁽¹⁾	85.5	83	68.4
Great Lakes ⁽¹⁾	76.6	78.5	75.9
Kruger	101.6	101.5	94.0
MacLaren	95.3	88.6	91.0
MacMillan Bloedel	83.7	87.9	84.7
Price	94.1	80.3	90.8
St. Raymond	96.1	84.9	94.7
F.F. Soucy ⁽¹⁾	76.1	69.1	82.6
⁽¹⁾ Firms with operating newsprint mills in Ontario.			

Source: Report to Ministers on Tri-Partite Meetings with
Manufacturers of Newsprint in Ontario and Quebec
(mimeo) 1973 pp 6,7.

TABLE III - 16
Newsprint Mills in Ontario.

<u>Company</u>	<u>Mill Location</u>	<u>Products</u>	<u>Production Capacity</u> <u>Tons Per Day</u>
Abitibi	Sault St Marie	Newsprint	
		Groundwood Specialities	345
	Iroquois Falls	Newsprint	935
		Wrapper	45
	Thunder Bay (Mission Point)	Sulfite Pulp	100
		Groundwood Pulp	300
		Newsprint	375
Abitibi Forest Products	Thunder Bay (Bare Point)	Sulfite Pulp	350
		Groundwood Pulp	115
		Newsprint	460
Domtar	Red Rock	Kraft Pulp	620
		Groundwood	150
		Kraft liner board	550
		Newsprint	200
Kimberly-Clark (Spruce Falls Provincial Paper Co. Ltd.)	Spruce Falls	Mangnafite Pulp	200
		Sulfite Pulp	365
		Groundwood Pulp	900
		Newsprint	1,000
Great Lakes	Thunder Bay	Groundwood Pulp	900
		Sulfite Pulp	300
		Kraft Pulp	550
		Newsprint	1,200
Ontario-Minnesota	Fort Frances	Groundwood Pulp	500
		Kraft Pulp	500
		Groundwood specialities & Newsprint	500
	Kenora	Groundwood Pulp	250
		Sulfite Pulp	185
		Newsprint	740
Ontario Paper Company	Thorold	Groundwood Pulp	530
		Sulfite Pulp	225
		Newsprint	710
Beaverwood Fibre Company	Thorold	Groundwood Pulp	125
		Waste Paper Pulp	190
		Newsprint	120
		Paperboard	190

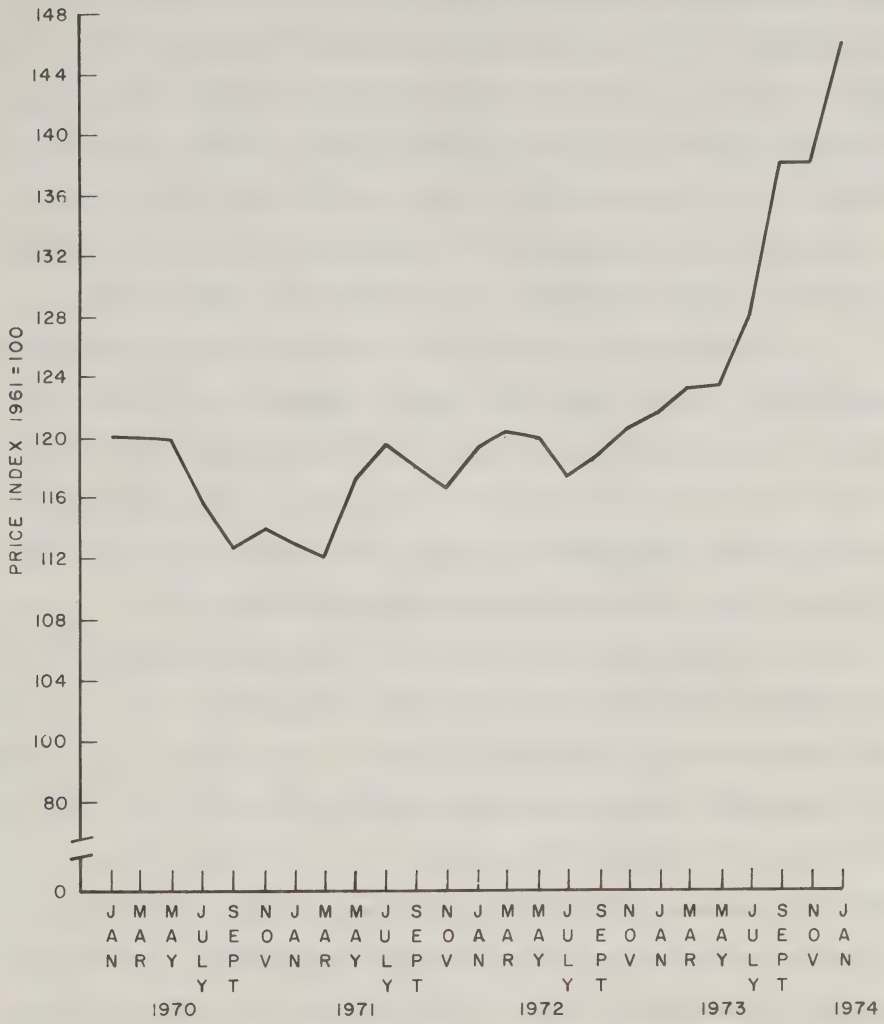
Strikes at mills and in the Canadian railroads forced the operating ratios of Canadian mills to drop to 70-75 percent during August through September 1973.⁴⁰ During other months, Canadian mills were operating up to 95 percent capacity. Canadian newsprint makers are currently operating in boom conditions. Price discounting was prevalent from 1970 to 1972. However, Figure III-10 shows the extent of the dramatic price rises which occurred during 1973.⁴¹ Prior to this, newsprint prices have been rising gradually, although exhibiting 4 to 8 percent fluctuations on a seasonal basis as indicated in Figure III-11. The export price of newsprint currently stands at \$230/ton, up from \$160/ton in 1972.

The boom market conditions have altered the distribution of market power between newsprint manufacturers and buyers. Prior to the current boom market, U.S. newspaper publishers wielded considerable market power as customers.⁴² Canadian newsprint manufacturers, being residual suppliers to these buyers, have engaged in rigorous competition by granting concessions to buyers in terms of price, product quality and service. Producers were also obliged to commit their output to publishers on long-term contracts which publishers often did not honor themselves.

⁴⁰ CPPA, Statistical Bulletins

⁴¹ Jon G. Udell, op. cit., January 21, 1974.

⁴² For a lucid analysis of the competitive relationships between newsprint makers and publishers, see Guthrie, op. cit., 1941.



SOURCE: STATISTICS CANADA, PRICES AND PRICE INDEXES

FIG. III - II EXPORT PRICE INDEX - NEWSPRINT - MONTHLY

Now, producers are able to sell just about everything they can produce without making these concessions to buyers. It also appears that most Canadian newsprint production will be shifted from a 32 to a 30 pound basis weight. This is significant from an environmental standpoint because less pulp is utilized to produce a ton of newspaper, hence, less effluent is generated per ton of newsprint production.

Market conditions look favorable for the newsprint industry in general and for Ontario newsprint producers in particular. Analysts predict a continued strong growth in demand through 1974 and on into to 1975.⁴³ The demand for consumer goods continues to rise thus prompting the growth in both local and national newspaper advertising.

There are, however, some uncertainties about supply and demand conditions over the next two years. Mills in the U.S. and Canada are presently running at or near full capacity and newsprint prices currently exceed \$230 per ton. Paper companies throughout North America are revising their expansion plans but they are loath to commit themselves to building any new mills. Expected increases in Canadian newsprint capacity of about 270,000 tons per year through 1975 will be brought by improvements and enlargements in

⁴³ Jon G. Udell, op. cit. January 21, 1974.

existing facilities.⁴⁴ Wood shortages and a dearth of suitable mill sites also tend to discourage new mill construction. However, the current newsprint contract price of \$230/ton may now be yielding the 12 to 15 percent return on investment which pulp and paper officials say is necessary to attract capital to major new ventures.⁴⁵ If current price levels hold through 1974, then it is likely that a number of new mill announcements will be forthcoming. These new mills will probably be located in the Southeastern U.S. or Western Canada. No announcements of added newsprint capacity have yet been made for Ontario.

U.S. newsprint consumption totalled 10.5 million tons in 1973, some two million tons less than anticipated due to supply shortages. During 1973, publishers adjusted to shortage conditions by eliminating magazines and special advertising enclosures, by using lighter paper (30 lb.) and by effecting other paper conservation methods. Whether or not these adjustments are permanent in light of higher prices and further expected shortages remains to be seen. If they are, then demand will be curtailed relative to previous years. If, on the other hand, there are no supply

⁴⁴ CPPA, Capacity Survey, April 1973, page 8.

⁴⁵ Gerd Wilke, "Few Paper Mills Eager to Expand", New York Times, March 17, 1974, page 5. See also Arthur D. Little, Inc. Economic Analyses of Proposed Effluent Guidelines, Pulp, Paper and Paperboard Industry (Washington, D.C.: U.S. Environmental Protection Agency, Office of Planning and Evaluation, September 1973), page IV-5.

disruptions and if demand adjustments are only temporary, then United States newsprint consumption should exceed 11 million tons in 1974.⁴⁶ If the responses to shortages and higher prices curtail demand, then consumption might reach 10.7 million tons, 200,000 tons above 1973 level.⁴⁷ It does not appear that fuel shortages will seriously affect the demand or the supply for newsprint in the United States during 1974.

Prospects for longer term (3-5 years) demand growth also appear to be favorable as the population ages. Some 66 percent of the population aged 18-24 are likely to read a newspaper on a given day. Their readership increases with age until they reach 65. The aging of the post World-War II cohort group should contribute to a steady rise in newspaper circulation. Consequently, it is projected that 13.1 million tons of newsprint will be consumed by 1980 if there is an adequate supply.⁴⁸ That energy or fibre shortages will limit supplies of newsprint over the medium (3-5 years) term is possible but not very likely.

Ontario can be expected to maintain its share of U.S. newsprint market through 1974. The key question for

46 Jon G. Udell, op. cit. 1974, page 30.

47 Ibid

48 Ibid

Ontario mills is the magnitude and location of any new capacity that may be built during the next two or three years. Consumption of newsprint in the North Central U.S., the area served by Ontario mills, has grown by a compound rate of only 2 percent per year.⁴⁹ This means that if newsprint capacity in Ontario increases by more than 25,000 tons per year in 1974 and 1975 then excess capacity conditions could develop by late 1975 with probable downward pressures on prices.

4. Fine Papers

For purposes of this discussion, the "fine paper" category includes groundwood speciality paper (over 50 percent groundwood content), book and printing paper (50 percent or less groundwood content), fine papers and uncoated miscellaneous grades. These products are often made to order and are produced in widely heterogeneous lots. Shipping costs of these products are relatively high so that fine paper mills are usually located near their markets. Hence, 70 percent of the shipments of these grades of paper originate in Ontario and Quebec.⁵⁰ The data in Table III-17 indicate that fine papers presently account for about 27 percent of the total value of shipments for all paper products produced in

⁴⁹ Ibid, page 28.

⁵⁰ Statistics Canada, Manufacturing and Primary Industries Division, Pulp and Paper Mills - 1971 (Ottawa, Statistics Canada, July 1973), page 13.

TABLE III-17

SHIPMENTS, EXPORTS, IMPORTS, AND VALUE OF SHIPMENTS OF **GROUNDWOOD SPECIALTY, PRINTING, BOOK AND WRITING PAPER GRADES, ONTARIO AND CANADA**

YEAR	CANADA			ONTARIO		
	Total Shipments		Imports % Canada Shipments	SHIPMENTS		VALUE OF SHIPMENTS \$million
	000 Tons	000 Tons		000 Tons		
1960	401		20			
1961	417		22			
1962	434	72	22			
1963	460	82	23			
1964	491	111	21			
1965	535	120	23	345.9		93.4
1966	621	172	25	407.4		111.8
1967	627	182	25	406.6		114.4
1968	663	162	31	437.1		119.2
1969 *	731	243	46	450.7		124.1
1970	880	339	46	505.3		139.4
1971	906	335	56	499.6		135.5
1972	1,013	354	60			

* GATT Tariff schedule, implemented in June 1969.

SOURCES:

Canadian Pulp and Paper Assoc., Reference Table 1973 Montreal: CPPA, Sept. 1973, p.p. 20, 21.
 Statistics Canada, Mfg. and Primary industries Division, Pulp and Paper Mills Ottawa.
 Statistics Canada, (annual)

Ontario, second only to newsprint. Ontario produces over 55 percent of all fine papers in Canada and generates 56 percent of the total value of shipments for these grades.⁵¹

Four companies (Abitibi, Domtar, Eddy and Rolland) produce 90 percent of the total Canadian output of fine papers.⁵² Table III-18 lists the fine paper mills located in Ontario and their respective capacities.

As mentioned earlier, fine papers are protected by tariffs and non-tariff barriers. Canadian prices of these products were thus maintained above U.S. prices by the amount of the tariff plus the exchange rate. Part of the rationale for tariffs on these and other paper and paperboard products is that the costs of producing these products are supposed to be higher in Canada than in the United States. A discussion of the factors which account for these higher costs is presented in Durzi.⁵³ However, Canada agreed to reduce its tariffs on most fine paper grades from 22½ percent to between 15 and 12½ percent as part of the General Agreement

⁵¹ Computed from Tables III-8 and III-9 respectively.

⁵² W. E. Haviland, N.S. Takacsy, E.M. Cape, Trade Liberalization and The Canadian Pulp and Paper Industry (Toronto: University of Toronto

⁵³ K.S. Durzi, op. cit., 1970, pp. 88-94.

TABLE III-18

FINE PAPER MILLS IN ONTARIO

COMPANY	MILL LOCATION	PRODUCTS	PRODUCTION CAPACITY (TONS/DAY)
Abitibi	Thorold	Fine Papers	250
Abitibi Forest Products	Thunder Bay	Fine Papers	250
Domtar	Cornwall	Kraft Pulp	400
		Fine Papers	620
	St. Cathar- ines	Fine Papers) Box Board)	100
	Toronto	Fine Board	28
E. B. Eddy and Co.	Ottawa	Fine Paper	155
		Paper Board	80
E. B. Eddy	Espanola	Kraft Pulp	625
		Fine and Coated Kraft Papers	150
Dryden Paper Co.	Dryden	Kraft and Fine Papers	200

for Trade and Tariffs (the Kennedy Round tariff negotiations) which was ratified in 1967. The entire new tariff schedule was implemented in June 1969 rather than being phased in over five years as had been originally planned. The current tariffs for selected paper commodities in the U.S., Canada, the U.K. and the EEC are listed in Table III-19.

The new rates had the effect of landing U.S. paper products in Canada at prices lower than the prevailing Canadian prices. Canadian paper manufacturers, particularly companies which produce fine papers, stated that this precipitous tariff adjustment would do irreparable harm to the industry. The companies predicted that prices would have to be lowered to the extent that they would lose money. Moreover, Canadian fine paper companies complained that cheaper U.S. imports would flood Canadian markets and curtail their sales volume.

It is clear now that these forecasts did not materialize. Indeed, the data indicate that Canadian fine paper manufacturers have benefited considerably from the GATT agreements which lowered tariffs in other countries as well as those in Canada. The data in Table III-17 show that there were substantial increases in Canadian shipments, Canadian exports, Ontario shipments and Ontario value of shipments for the years 1968, 1969 and 1970. Exports of fine papers increased by 50 percent between 1968 and 1969 and by another 40 percent from 1969 to 1970.

TABLE III - 19

CUSTOMS TARIFFS FOR PULP AND PAPER PRODUCTS AS OF MARCH, 1974

Product Category	Canada	Rate of Duties (% ad valorem)			E E C
		U.S.	U.K.		
Pulp	Free	Free	Free	3% (duty free for first 1,935,000 metric tons)	
Newsprint	Free	Free	Free	7% (duty free for first 625,000 metric tons)	
Printing Papers	12½	.08¢/lb + 1.5%	15	12	
Fine Papers (stationery)	15	.7¢/lb 3.5%	15	12	
Wrapping paper					
Grease-proof wrapping	15	0.5¢/lb	10	-	1
Paperboard					165
Corrugating medium	17½	3	10-18	14	
Boxboard	15	3	-	65-12	
Lineboard	15	-	10	12	
Shoeboard	15	3			
Tissues					
Cigarette paper	15	7.5			
Wallpapers	15	5			
Coated papers	15	0.6¢/lb 4%			
Building papers and saturated felts	15	Free			

SOURCES: Canada Department of National Revenue, Customs and Excise.
United States Department of the Treasury, Bureau of Customs.

There was no increase in the import of fine papers into Canada between 1969 and 1970. In fact, imports of all paper products grew by 31 percent during the four years following implementation of the tariff (1969 to 1972) whereas over the four years prior to the agreement (1966 to 1969), the quantity of imports had increased by 40 percent.⁵⁴ Furthermore, during the four years prior to 1969, the tonnage of Canadian exports of paper products increased by 24 percent while exports grew by more than 63 percent during the four years after the tariff change. It is clear that, far from being "irreparably damaged" by the GATT tariff schedule, Canadian and Ontario fine paper manufacturers have substantially increased their sales and their revenues following the introduction of the new tariffs.

What about the effect of the new tariffs on prices? The Canadian price index for fine papers exhibit no noticeable reductions during 1969 and 1970. Indeed, prices of

⁵⁴ Canadian Exports and Imports of All Paper and Paperboard Products.

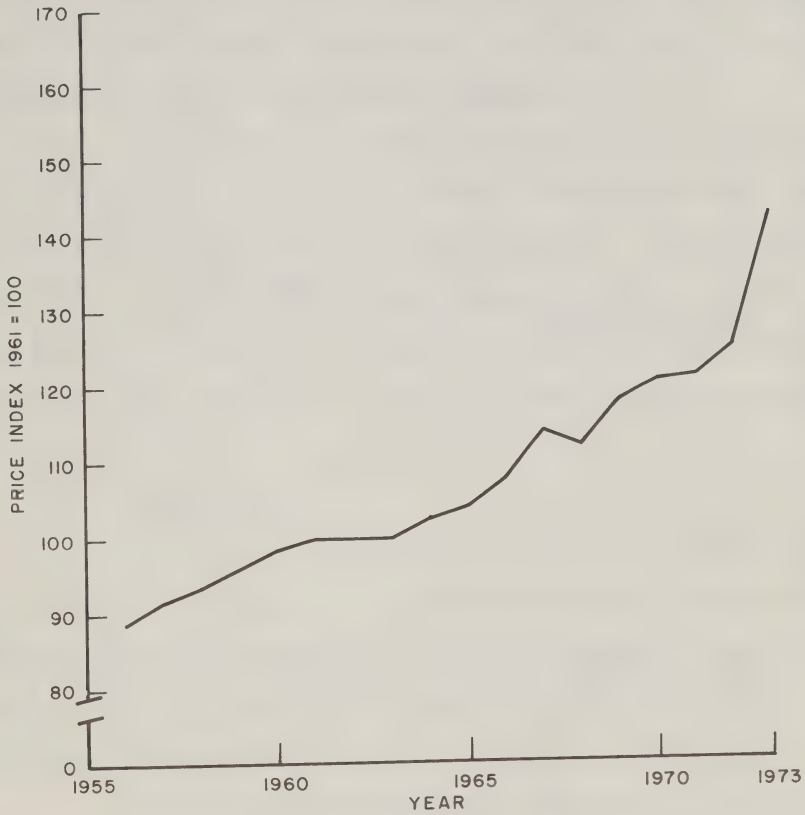
	<u>t o n s</u>		
	<u>1966</u>	<u>1969</u>	<u>1972</u>
Canadian Exports of paper (except newsprint) and paperboard.	698	865	1413
Canadian Imports of paper and paperboard products.	161	224	293

CPPA, Reference Tables, 1973, pp. 20, 21

these products rose by five percent between 1969 and 1970. The annual and monthly price index for fine papers are plotted in Figures III-12 and III-13. It is interesting to note just how steady these prices have been. Contrast the price stability in this protected market with prices in the volatile sulfate pulp market which is vulnerable to competitive forces outside of Canada. Stable prices, such as those obtained in the fine paper market, suggest, but do not prove, that producers have a degree of control over these prices. This would be consistent with the high degree of concentration in this market. As with other pulp and paper products, prices rose almost monthly through 1973 until the fine and printing paper price index exceeded 1972 levels by 35 percent.

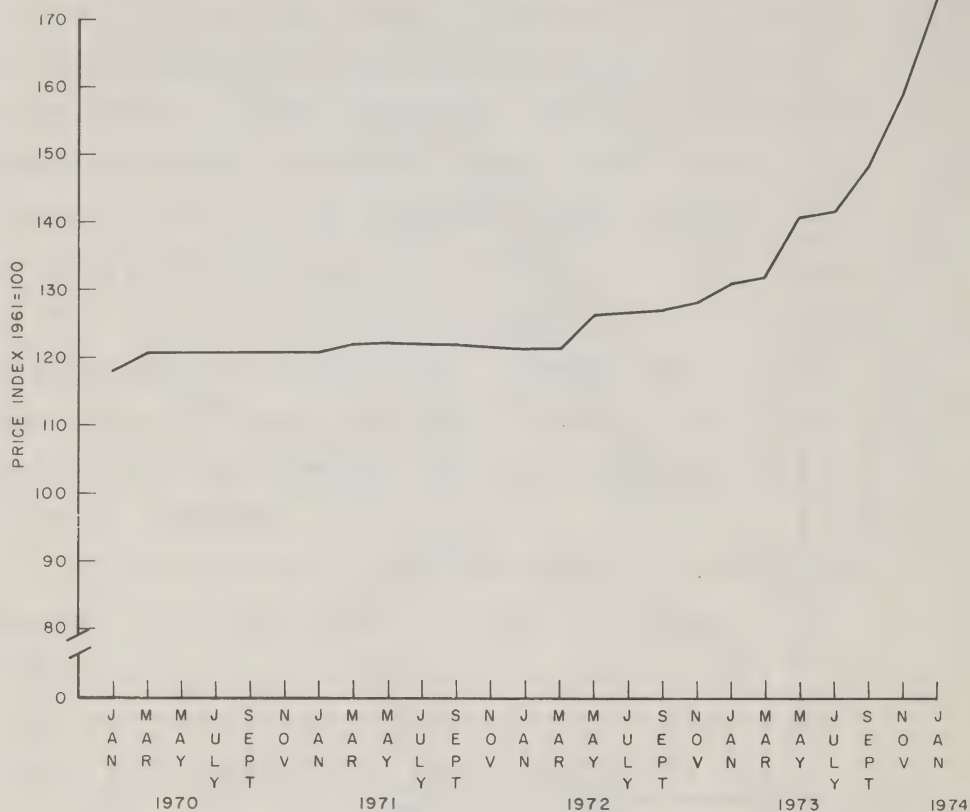
Consumption of printing and writing paper in North America, the primary market for Ontario production, is expected to grow by 6 percent per year through 1980.⁵⁵ Demand for these grades of paper is relatively price inelastic since there are few substitutes for the uses to which these papers are put and because these products account

⁵⁵ Working Party on Demand Projections, Interdepartmental Committee for Review of the Canadian Pulp and Paper Industry. Consumption Projection for Paper 1970 - 1985.



SOURCE : STATISTICS CANADA, PRICES AND PRICE INDEXES

FIG. III - 12 INDUSTRIAL SELLING PRICE INDEX - FINE PAPERS - ANNUAL



SOURCE: STATISTICS CANADA, PRICES AND PRICE INDEXES

FIG. III - 13 INDUSTRIAL SELLING PRICE INDEX - FINE PAPERS - MONTHLY

for a very small proportion of consumers' incomes or the costs of final products. It is unlikely, therefore, that higher prices will curtail consumption very much. This market looks exceptionally good through 1975 and beyond. Prices in particular are expected to remain high enough to keep earnings at profitable levels.

A key variable will be exports. The lifting of price controls in the United States may prompt some capacity expansion of this product in that country. Even if this happens, it seems likely that Canadian producers will be called upon to make up shortages in U.S. production over the next year as well as meet the growth in demand forecast for Canada.

5. Paperboard

Paperboard production in Ontario is second only to newsprint in terms of the volume of output, although it lags behind fine papers in value of shipments. Paperboard grades are also protected by tariffs which were reduced in 1969 when the new GATT rates were promulgated in Canada.

Paperboard production is comprised of two main categories: containerboard and boxboard. Containerboard is used almost entirely to manufacture shipping containers which are themselves composed of linerboard, corrugating medium and dripboard. Linerboard is made from sulfate pulp while corrugating medium and dripboard are produced from

sawdust and waste-paper grade pulps. Boxboard may be made from all types of pulp or repulped waste-paper. The three main boxboard categories include folding, set-up and miscellaneous.

Table III-20 lists the mills in Ontario which produce paperboard. Of the approximately 1,590 tons per day of paperboard capacity in Ontario, about 1,000 tons per day is containerboard and the rest consists of box and building boards. Current production in Ontario is over 650,000 tons per year, about one-third of the total output in Canada. Quebec produces almost half of the nation's paperboard.

Table III-21 presents data concerning paperboard shipments, production, imports and exports for Canada and Ontario.⁵⁶ It is clear from the data in this Table that Canadian paperboard sales or shipments and exports have enjoyed steady growth over the past six years. Production in Ontario, on the other hand, peaked in 1965 and did not regain this output level again until 1970. This was due in part to the fact that most of the growth in paperboard capacity

⁵⁶ There seems to be wide discrepancies in the statistics provided by Statistics Canada and those listed in the CPPA Reference Tables. These discrepancies are likely due to the differences in definitions of Categories. The direction of change in both series agree, however. The data presented here are Statistics Canada figures.

TABLE III - 20

PAPERBOARD MILLS IN ONTARIO

COMPANY	MILL LOCATION	PRODUCTS	CAPACITY (TONS/DAY)
Abitibi	Sturgeon Falls	Sulfite pulp Hardboard	225 160 (140 million sq. ft.)
Atlantic Packaging	Scarborough	Corrugating Medium	220
Canadian Johns Manville	North Bay	Corrugating Medium, Linerboard	120
Continental Can of Canada, Limited	Toronto	Building boards, ceiling tiles, etc. Boxboard and Corrugating Medium Paperboard	125 130 110
Domtar	Trenton St. Catharines Thorold Toronto	Corrugating Medium (Fine Paper/Boxboard) Sheathing board and Felts Paperboard	150 100 65 28
Domtar Construction Materials Limited	Red Rock	Kraft Pulp Groundwood Pulp Kraft Linerboard Newsprint	635 150 555 205
Strathcona Paper Co.	Strathcona	Paperboard	100
Sunoco, Ltd.	Brantford	Paperboard	20
Miller Brothers Paper Co.	Glen Miller	Paperboard	90
Beaverwood Fibre Co.	Thorold	Groundwood pulp Waste paper pulp Newsprint Paperboard	125 190 120 190

- 172 -

TABLE III - 21

PAPERBOARD PRODUCTION, SHIPMENTS, IMPORTS AND EXPORTS, CANADA AND ONTARIO

Year	CANADA				ONTARIO		
	Production 000 Tons	Shipments 000 Tons	Imports 000 Tons	Exports 000 Tons	Production 000 Tons	Shipments	Value of Shipments \$million
1960	1,060	996			538		
1961		1,009			483		
1962		1,082			524		
1963		1,205			536		
1964	1,425.2	1,287			579		
1965	1,553	1,409	90	186	581.2	577.5	77.9
1966	1,699	1,516	84	254	541.9	530.7	71.5
1967	1,732	1,567	91	287	548.9	537.4	73.9
1968	1,764	1,627	94	315	555.6	543.9	78.5
1969	1,907	1,744	100	353	574.1	566.0	81.4
1970	1,850.1	1,751	116	384	593.2	566.0	83.5
1971	1,871.3	1,806	148	395	638.0	630.2	91.3
1972		1,992					
1973		2,207					

- 173 -

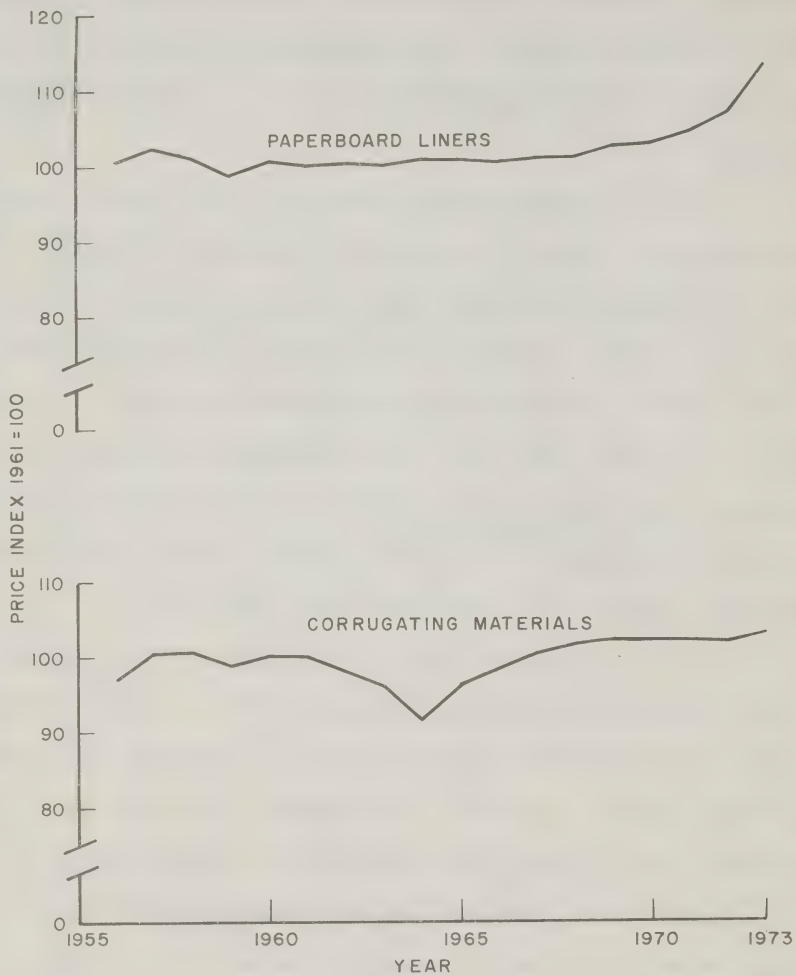
SOURCES: Statistics Canada, Manufacturing and Primary Industries Division, Pulp and Paper Mills
 Ottawa: Statistics Canada (annual)
 Canadian Pulp and Paper Association, Reference Tables 1973, Montreal: CPPA, Sept. 1973,
 p.p. 20, 21.

over the past decade has occurred outside of Ontario. Since paperboard production, particularly containerboard, requires sulfate pulp for strength, new paperboard capacity has been located near the kraft pulp mills in B.C., Quebec and the U.S. South.

While Canada exports about 400,000 tons of paperboard each year, Ontario paperboard mills are oriented toward their own domestic markets. Substantial amounts of paperboard are, in fact, shipped into Ontario from Quebec and the U.S. for use by industrial establishments located in this province. In addition, over 100 paperboard converting operations which produce 54 percent of all Canadian factory boxes are in Ontario.⁵⁷ Some 80 percent of all paperboard converting plants are integrated with board mills.

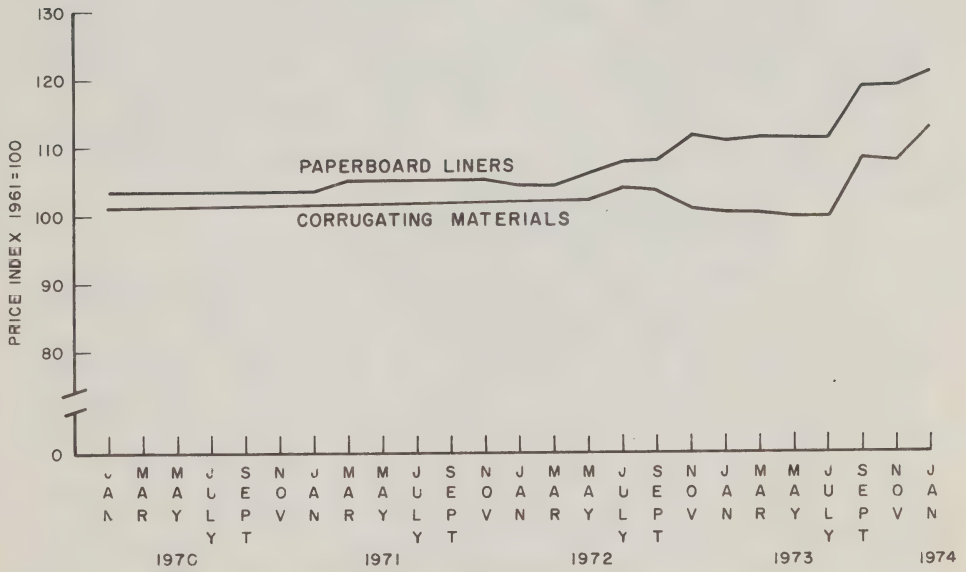
Prices of paperboard, like those of other paper products, have risen substantially in 1973. Price indices for liners and corrugating board are illustrated in Figures III-14 and III-15. As with fine papers, there is no indication that prices were affected by the change in tariffs. The price indices for corrugating medium and boxboard rose by 10 and 14 percent respectively during 1973.

⁵⁷ K. Durzi, op. cit., 1971, page 82



SOURCE: STATISTICS CANADA, PRICES AND PRICE INDEXES

FIG. III - 14 INDUSTRIAL SELLING PRICE INDEXES - PAPERBOARD LINERS AND CORRUGATING MATERIALS - ANNUAL



SOURCE: STATISTICS CANADA, PRICES AND PRICE INDEXES

FIG. III - 15 INDUSTRIAL SELLING PRICE INDEXES - PAPERBOARD LINERS AND CORRUGATING MATERIALS - MONTHLY

Since most paperboard is used to package manufactured goods and food, this sector is sensitive to industrial activity. The future performance of this market will depend a great deal on the general condition of the Canadian and U.S. economies. It is, therefore, difficult to forecast demand during the next 12 to 24 months for this market. However, demand and prices will probably remain strong and continue to rise over the next 6 to 9 months. The industry is intending to add more than 450,000 tons per year of containerboard capacity and 130,000 of boxboard capacity by 1976.⁵⁸ Expectations for this market over the next two years are therefore optimistic.

6. Wrapping and Tissue Paper

Taken together, these products account for only 6 percent of Ontario paper production (including newsprint) and 8 percent of the total value of shipments. Production of wrapping paper in Ontario presently accounts for 15 percent of the total Canadian output of wrapping paper. On the other hand, Ontario manufactures about 29 percent of the total Canadian production of tissue and sanitary papers. About half of the total Canadian production of

⁵⁸ "Most New Canadian Capacity from Existing Mills and Equipment", Paper Trade Journal, July 15, 1974, page 26.

both wrapping and tissue papers come from Quebec mills. The mills which produce these products in Ontario are presented in Table III-22.

Wrapping paper is not a growing segment of the Ontario paper industry. Production in the province during 1970 and 1971 dropped by about 15,000 tons from a high of 93,600 tons in 1969.⁵⁹ On a national basis, wrapping paper production had been growing fairly steadily until 1970 when production dropped by 128,000 tons to 482,500 tons from the previous year, Canadian exports of wrapping papers totalled 218,000 tons in 1972, up from 143,000 tons in 1971, while 17,000 tons were imported.⁶⁰ Exports in this sector also increased after the GATT tariffs reductions were instituted.

The important question concerning this market is whether Ontario mills can make and sell kraft wrapping papers in competition with specialized mills in western Canada and the United States. Kraft pulping capacity has been gravitating toward western Canada and the U.S. south and kraft paper production has, to a certain extent, been following it. In the opinion of some analysts, southern

⁵⁹ See Appendix D.

⁶⁰ CPPA, Reference Tables, 1973, p. 20

TABLE III - 22

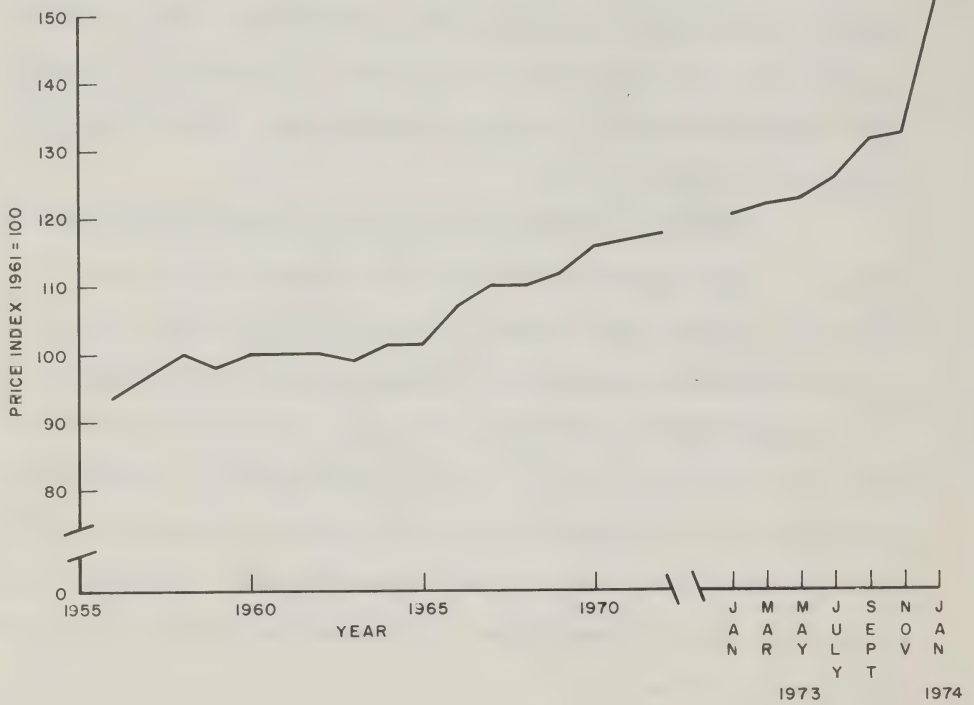
WRAPPING AND TISSUE PAPER MILLS IN ONTARIO

<u>COMPANY</u>	<u>MILL LOCATION</u>	<u>PRODUCTS</u>	<u>CAPACITY TONS/DAY</u>
Anglo Canadian Dryden Paper Co.	Dryden	Kraft pulp Kraft papers and paperboard	630 200
Dominion Cellulose (CIP)	Toronto	Facial and Toilet Tissue	 175
Eddy Forest Products	Espanola	Kraft pulp Kraft papers (wrapping and fine	625 150
Kimberly-Clark	St. Catharines	Tissue and Crepe	110
	Huntsville	Crepe	70
	Kapuskasing	Crepe	75
Atlantic Pkg. Co.	Scarborough	Corrugating medium) Butcher's wrapping)	 120

U.S. mills have a slight advantage over eastern Canadian mills with respect to this product.⁶¹ However, prices of kraft wrapping paper, which have been rising gradually in the past (see Figure III-16) have taken off in 1973. In the current period of paper product shortages and rising prices, the manufacture of wrapping paper remains a profitable activity for Ontario mills. Note also that the two Ontario mills which produce kraft papers also make a wide variety of fine papers and paperboards. Production capacity that might be used for wrapping papers can, therefore, be utilized for other grades.

While not exhibiting the high growth characteristics of other product categories, the production and export of tissue and sanitary papers has remained strong. Prices of facial tissues, toilet paper and table napkins, the primary products of this category, have risen steadily over the past five years. As is illustrated in Figure III-16, the rate of which these prices are rising increased in 1973 in step with other products and commodities. The market and prices for these commodities is expected to remain strong and relatively stable.

⁶¹ W.E. Haviland, N.S. Takacsy and E.M. Cape, op. cit. 1968, page 62.



SOURCE: STATISTICS CANADA, PRICES AND PRICE INDEXES

FIG. III-16 INDUSTRIAL SELLING PRICE INDEX - KRAFT WRAPPING PAPER - ANNUAL - MONTHLY 1973

E. THE STRUCTURE OF THE ONTARIO PULP AND PAPER INDUSTRY

1. Introduction

Knowledge of the structural and organizational characteristics of an industry are necessary to assess the consequences of the environmental policies contemplated in this study. The object of this section is to document the important structural characteristics of the pulp and paper industry in Ontario. Structural elements to be considered include the concentration of each major product market, the size of the mills relative to other mills in Canada, the product mix of individual mills, the degree of vertical intergration in the industry, growth patterns of the industry, the location of mills, ownership patterns in the industry, and the comparative cost conditions of the industry in Ontario relative to other producing areas.

It should be noted at the outset that pulp and paper mills in Ontario are actually components of a "North American" pulp and paper industry. This is a result of two factors. Free trade in pulp and newsprint between the U.S. and Canada has encouraged the Canadian industry to specialize in these products. Secondly, there is substantial U.S. ownership of Canadian pulp and paper mills. Many of the structural features discussed in this section refer to the North American pulp and paper industry but are also indicative of the Ontario component.

2. Concentration, product mix and growth in the pulp and paper industry

The concentration of an industry or a market refers to the proportion of that market or industry which each firm controls. Concentration is important because it provides an indication of the degree of competition which prevails in the industry. If each firm in a market controls only a small proportion - say less than 5 percent - of sales or production capacity, no single firm can affect a change in prices by its own action. However, if a small number of firms dominate a given market, such a market or industry is called an oligopoly. Again, no single firm is dominant but the actions of a single firm can affect the price or output of the entire market. Hence, firms are aware of this interdependence and make their decisions accordingly. A market or industry dominated by a single firm is said to be monopolistic. The classification of the particular market or industry as competitive, oligopolistic or a monopoly has important implications for price making and the responses of the industry to government policies.

Generally speaking, the pulp and paper industry in Canada is not a concentrated industry. In all of Canada, 95 companies operate 141 pulp and paper mills while 19 firms operate 33 mills in Ontario. For all pulp and paper products, the four largest firms in Canada control less than 40 percent

of the nation's production capacity.⁶²

The level of concentration differs among product groups, however. For example, in 1969, the five largest pulp and paper companies in Canada controlled 54 percent of the total Canadian newsprint manufacturing capacity.⁶³ On the other hand, about 88 percent of the output of fine papers in Canada is produced by four firms: Domtar, Abitibi, Eddy and Rolland.⁶⁴ The production capacity of tissue and creped wadding is also relatively concentrated with four companies - Scott, Kimberly-Clark, Canadian International Paper and E.B. Eddy - who control about 74 percent of Canada's total capacity for these products.⁶⁵ The distribution of newsprint capacity is revealed in Table III-23. The largest four firms own only 43 percent of the total capacity and the largest eight control about 60 percent of total Canadian newsprint capacity.

The concentration of capacity in each product market by pulp and paper companies operating in Ontario is

⁶² Lockwood Publishing Co. Inc., Lockwood's Directory of the Paper and Allied Trades - 1971/72 (New York: Lockwood Publishing Co. Inc., 1972), page 1.

⁶³ These companies are MacMillan Bloedel, Canadian International Paper, Abitibi, Consolidated Bathurst and Price. Report to Ministers on Tri-Partite Meeting with Manufacturers of Newsprint in Ontario and Quebec, December 1972, page 4.

⁶⁴ W.E. Haviland, N.S. Takascy and E.M. Cape, op. cit., 1968, page 47

⁶⁵ Ibid.

TABLE III-23

NEWSPRINT CAPACITY - 1972

(thousands of tons/year)

Company	<u>Que.</u>	<u>Ont.</u>	<u>N.S.</u>	<u>N.B.</u>	<u>Nfld.</u>	<u>Man.</u>	<u>B.C.</u>	<u>TOTAL</u>	<u>Percent Total Capacity</u>
<u>Under Foreign Producer Control or Ownership</u>									
Anglo-Canadian	327							327	
Beaver Wood Fibre		34						34	
Bowaters Canadian			185		360			545	
CIP	877			273				1,150	11
Crown Zellerbach							294	294	
Nova Scotia Pulp			153					153	
Ontario-Minnesota		314						314	
	<u>1,204</u>	<u>348</u>	<u>338</u>	<u>273</u>	<u>360</u>	<u>—</u>	<u>294</u>	<u>2,817</u>	
<u>Under Foreign Publisher Influence or Ownership</u>									
Donohue	243							243	
Ontario Paper	511	253						764	7
Gaspesia	233							233	
Spruce Falls		334						334	
	<u>987</u>	<u>587</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>1,574</u>	
<u>Under Canadian Ownership</u>									
Abitibi	159	709				174		1,042	10
B.C. Forest Products							236	236	
Consolidated-Bathurst	971							971	9
Domtar	484	72						556	
Great Lakes		437						437	
Kruger	156							156	
MacLaren	148							148	
MacMillan Bloedel				343			973	1,316	13
Price	532				305			837	8
St. Raymond	15							15	
F.F. Soucy	37							37	
	<u>2,502</u>	<u>1,218</u>	<u>—</u>	<u>343</u>	<u>305</u>	<u>174</u>	<u>1,209</u>	<u>5,751</u>	
TOTAL CANADA	4,693	2,153	338	616	665	174	1,503	10,142	

SOURCE: Report to Ministers on Tri-Partite meetings with manufacturers of Newsprint in Ontario and Quebec, Dec. 1972.

summarized in Table III-24. The significant fact revealed by this table is that the production capacity of those product sectors protected by tariffs, i.e., fine papers, paperboard and tissues, tends to be concentrated with fewer firms than are in the newsprint or pulp sectors. There also seems to be fewer firms engaged in making fine papers and tissue than market pulp, newsprint or paperboard. The fact that fine papers, tissues and, to a certain extent, paperboard capacity are concentrated in the hands of relatively few firms has important implications for the pricing of these products and the ability of the firms which produce them to pass added costs on to the consumer in higher prices.

Information concerning the trends of certain characteristics of pulp and paper mills in Canada are presented in Table III-25. It is clear from the information presented here that nearly all of the new mills that have been built in recent years have been located in British Columbia and provinces other than Quebec and Ontario. Although mills in Ontario have been enlarged and expanded to the extent that output has almost doubled since 1945-46, pulp and paper mills in Ontario remain, on the average, older and smaller than facilities elsewhere in Canada. Note too, in Table III-25, the average output of a mill in Ontario is currently below the Canadian average.

TABLE III-24

CONCENTRATION OF PULP AND PAPER PRODUCTION
CAPACITY IN ONTARIO, 1971/72

Company	Total Capacity in Tons/Day									
	Kraft Pulp		Newsprint		Fine Papers		Paperboard		Tissue and Crepe	
	Tons/ Day	% Cap.	Tons/ Day	% Cap.	Tons/ Day	% Cap.	Tons/ Day	% Cap.	Tons/ Day	% Cap.
American Can	486	16								
Abitibi	340	11	2,115	33	500	31	380	23		
Atlantic Packaging							120	7		
Beaverwood Fibre			120				190	11		
Anglo-Canadian (Dryden)	430	14			200	12				
Domtar	230	7	205		620	38	393	24		
E. B. Eddy	475	15			305	19	80			
Continental Can							240	14		
Ontario-Minnesota			1,210	19						
Great Lakes	450	15	1,200	19						
Kimberly-Clark	675	22	1,000	16					273	61
Ontario Paper			720	11						
Strathcona							100			
Sunoco							20			
Miller Bros.							90			
IKO Brampton							50			
CIP									175	39
TOTALS	3,085	100	6,385	100	1,625	100	1,663	100	448	100

SOURCE: Data from Table III-26

TABLE III-25

CHARACTERISTICS OF THE CANADIAN PULP AND PAPER INDUSTRY, 1945-1971

	Two Year Averages		1963/64		1970/71	
	1945/46	1954/55	paper	pulp	paper	pulp
CANADA						
Production (000T)	6280	10098	13274	18270.8	12353.2	
Percent of Total	100	100	100	100	100	
No. of Mills	111	125	128.5	141		
Average output per Mill (000Tons)	57	80	103.4	130	87.9	
Average number of persons employed per mill	383	492	517	568		
Average output per employee	149	259	200	230	155	
QUEBEC						
Production (000T)	3197	4433	4633	6373.2	5522.9	
Percent of Total	50.9	43.9	34.9	35.9	44.8	
No. of Mills	49.5	55	54.4	55		
Average output per Mill (000Tons)	64.6	80.1	85	114.9	99.5	
Average number of persons employed per mill	419	479	483	554		
Average output per employee	154	167	176	207	179	

Continued

TABLE III-25 (CONTINUED)

	Two Year Averages		1963/64		1970/71	
	1945/46	1954/55	paper	pulp	paper	pulp
ONTARIO						
Production (000T)	1827	2706	3332	3884.6	3148.5	
Percent of Total	29.1	26.8	25.1	21.4	22.5	
No. of Mills	41.5	41	38.5		37	
Average output per Mill (000T)	44	66	86.5	106.5	86.3	
Average number of persons employed per mill	315	464	529		596	
Average output per employee	140	142	164	179	145	
BRITISH COLUMBIA						
Production (000T)	521	1313	2642	4689.2	1929.6	
Percent of Total	8.3	13	19.4	25.7	15.6	
No. of Mills	7	12	14		21	
Average output per Mill (000T)	74.4	109.4	188.7	228.6	94.1	
Average number of persons employed per mill	591	564	612		752	
Average output per employee	126	194	308	304	125	
OTHER PROVINCES						
Production (000T)	735	1645	2667	3323.7	1752.1	
Percent of Total	11.7	16.3	20	20	14	
No. of Mills	13	17	21.5		28	
Average Output per Mill (000T)	56.5	96.7	124	118.9	62.8	
Average number of persons employed per mill	346	548	475			

SOURCE: W.E. Haviland, N.S. Takacsy and E.M. Cape, Trade Liberalization and the Canadian Pulp and Paper Industry (Toronto: University of Toronto Press, 1969).
 Statistics Canada, Pulp and Paper Mills (Various issues).

The location, product mix, capacity, age and the company which owns each mill in Ontario are listed in Table III-26. The product mix of a mill is important because a mill which produces only a single product is likely to be more vulnerable to market fluctuations than a mill which manufactures a variety of products. Furthermore, firms which own more than one mill would be better protected from business cycles than single establishment firms. The over-all operation of the firm may be profitable even though one of the mills might be temporarily operating at a loss. A multi-mill firm would be in a much better position to subsidize an "unprofitable" mill for a period of time until markets improved. According to the data in Table III-26, only 4 companies are single-mill firms. One of these, Great Lakes Paper Ltd., manufactures a variety of market pulps as well as newsprint. The other three, Strathcona Paper, Atlantic Packaging and Miller Brothers Paper Co. are all relatively small paperboard manufacturers. All of the rest of the mills in the province are owned by multi-plant firms or are subsidiaries to larger U.S. corporations.

TABLE III-26

OWNERSHIP, PRODUCTS AND CAPACITIES OF OPERATING
PULP AND PAPER MILLS IN ONTARIO, 1973

FIRM	LOCATION	PRODUCTS	CAPACITY TONS/DAY	YEAR ORIGINALLY BUILT	APPROX. AGE OF CURRENT FACILITIES
American Can of Canada Ltd.	Marathon	Bleached kraft market pulp	485	1945	28
Abitibi Paper Co.	Sturgeon Falls	Sulfite Pulp (NSSC) Corrugating Medium Hardboard	225 220 160	1900	50+
(Provincial Paper)	Thorold	De-inking Plant Purchased pulp Fine Papers	80 170 250	1903	70
	Smooth Rock Falls	Bleached kraft market pulp	340	1918	9
	Sault Ste. Marie	Ground wood pulp Newsprint Groundwood Spec.)	280 345	1898	
	Iroquois Falls	Sulfite pulp (Na) Groundwood pulp Newsprint Wrapper	230 750 935 45	1914	60
(Provincial Paper)	Thunder Bay	Groundwood pulp Sulfite pulp (Ca) Fine papers	200 250		
	Thunder Bay (Ft. Wm. or Mission Div.)	Sulfite (Na) Groundwood Newsprint	100 300 375	1921	53

Continued

TABLE III-26 (CONTINUED)

FIRM	LOCATION	PRODUCTS	CAPACITY TON/DAY	YEAR ORIGINALLY BUILT	APPROX. AGE OF CURRENT FACILITIES
Anglo-Canadian (Dryden Paper Co.)	Thunder Bay (Bare Point Mill)	Sulfite (Na)	115	1926	48
		Groundwood pulp	350		
		Newsprint	460		
	Dryden	Kraft pulp	630	1913	
		Bl. kraft Mkt. pulp Wrapping & fine papers	430 200		
	Toronto	Corrugating medium	65		
Atlantic Packaging	Scarborough	Corrugating medium wrapping	120		
Canadian Inter- national Paper Ltd.	Hawkesbury	Dissolving Cellulose fibre (Sulfite)	270		
(Dominion Cellulose)	Toronto	Toilet Tissue	175		
Continental Can of Canada Ltd.	Toronto	Boxboard & Corrugating medium	130		
	Toronto	Paperboard	110		
Canadian Johns Manville	North Bay	Mineral and Wood fibre- board ceiling tile	125	1957	
Domtar Ltd.	Trenton	Sulfite (NSSC)	150	1926	
		Semi chemical corruga- ting	150		
	Toronto	Board	28		

Continued

TABLE III-26 (CONTINUED)

FIRM	LOCATION	PRODUCTS	CAPACITY TON/DAY	YEAR ORIGINALLY BUILT	APPROX. AGE OF CURRENT FACILITIES
	Red Rock	Kraft pulp	635	1945	3
		Groundwood	150		
		Kraft Linerboard	555		
		Newsprint	205		
	Cornwall	Kraft pulp	400	1883	
		Bl. kraft Mkt. pulp	230		
		Fine papers	620		
		Boards	50		
	St. Catharines	Fine papers)	100		
		Boards)			
	Thorold	Building Board	65		
Kimberly- Clark	St. Catharines	Groundwood	20		
		Tissue and crepe	90		
	Terrace Bay	Bl. kraft Mkt. pulp	425		
		Creped wadding	100		
	Kapuskasing	Cellulose wadding	83		
(Spruce Falls Pulp and Paper)	Kapuskasing	Magnatite pulp	200		
		Sulfite (Ca)	365		
		Groundwood	900		
		Bl. Sulfite Mkt. pulp	250		
		Newsprint	1000		
Eddy Forest Products (Weston)	Espanola	Kraft pulp	625		
		Bl. kraft Mkt. pulp	475		
		Fine papers	150		

Continued

TABLE III-26 (CONTINUED)

FIRM	LOCATION	PRODUCTS	CAPACITY TON/DAY	YEAR ORIGINALLY BUILT	APPROX. AGE OF CURRENT FACILITIES
(E.B. Eddy)	Ottawa	Board	80	1905	
		Fine papers	155		
Great Lakes Paper	Thunder Bay	Groundwood pulp	900	1966	
		Kraft pulp	600		
		Sulfite (Mg)	300		
		Bl.kraft mkt. pulp	450		
		Sulfite Mkt. pulp	85		
		Newsprint	1200		
Ontario-Minnesota (Boise Cascade)	Fort Frances	Ground wood pulp	500	1914	
		Kraft pulp	500	1971	
		Bl. kraft mkt. pulp			
		Newsprint	450		
		Groundwood specialties)			
	Kenora	Sulfite (Mg)	210		
		Groundwood	625		
		Newsprint	760		
Ontario Paper Co. Thorold (Chicago Tribune)	Thorold	Groundwood pulp	530	1913	
		Sulfite pulp (Na)	240		
		Newsprint	720		
		Mkt. sulfite pulp	100		
Beaver Wood Fibre (Georgia Pacific)	Thorold	Groundwood pulp	125	1914	
		Waste paper pulp	190		
		Newsprint	120		
		Board	190		

Continued

TABLE III-26 (CONTINUED)

FIRM	LOCATION	PRODUCTS	CAPACITY TON/DAY	YEAR ORIGINALLY BUILT	APPROX. AGE OF CURRENT FACILITIES
Strathcona Paper	Strathcona	Paper board	100		
Sunoco Ltd.	Brantford	Paper board	20		
Miller Bros. Paper	Glen Miller	Paper board	90		
IKO Industries	Brampton	Board and Insulation	50		
TOTAL			25,231		

SOURCE: Lockwood Publishing Co., Inc. Lockwood's Directory of the Paper and Allied Trades, 1971/72
New York: Lockwood Publishing Co., Inc., 1972.

The significance of the locations of mills will be discussed in the section concerning the importance of the mills to communities.

3. Mill Size

Although the empirical evidence is somewhat fragmentary, it appears that pulp and paper production processes are subject to economies of scale.⁶⁶ That is, the larger the plant, the lower are the unit costs of production. This is due in part to the large proportion of fixed costs which are required for such operations. Conversely, smaller mills generally have higher unit or average costs and it is these mills which are most likely to become unprofitable if pollution abatement costs are incurred. Critically small mills in Ontario are, therefore, identified in the following manner.

The distribution of mill sizes by province and by product is illustrated in Table III-27. The means and standard deviations of mill capacities were calculated from

⁶⁶ John A. Guthrie. The Economics of Pulp and Paper (Pulman, Washington: The State College by Washington Press, 1950), page 164.

TABLE III-27

MILL SIZE DISTRIBUTIONS, CANADA, 1971

Product - Tons/Day (Province)	100	100	199	200	299	300	399	400	499	500	599	600	699	700	799	800	899	900	999	1000
Kraft																				
BC				1					1	111	1111	1111	1111	11	11	1	11	11		1
NB						1				1										
Ont.								111		11	11	111								
Que.				1		1				11	11			1						
Sulfite																				
NB				1																
Ont.		11		11			1111													
Que.		11		11				11												
Newsprint																				
BC				1										11		11				11
NB																11				
Ont.		1		1		1		1		1				11				1		11
Que.	11	1		11		11		111				1		11		111				1111
Board																				
BC	111	11				1				1										
NB	1			1						1										
Ont.	111	111					11													
Que.	11111	11111		1						1										
Fine and Wrapping																				
BC	1																			
Ont.	11	11		11									1							
Que.	111			11			1													

SOURCE: Lockwood Publishing Co., Inc., Lockwood's Directory of the Paper and Allied Trades 1971/72, New York: Lockwood Publishing Co., Inc., 1972.

these data and presented in Table III-28. Mills with a capacity smaller than one standard deviation below the mean for the product group are hypothesized to be on the lower fringe of economic viability. For Canadian and Ontario mills, the mean capacity less one standard deviation is presented below for each product category.

Mean Product Capacity Less One Standard Deviation

Product Category	Canada (Tons Per Day)	Ontario
Kraft Pulp	381	438
Sulfite Pulp	173	168
Newsprint	531	270
Paperboard	23	65
Fine and Wrapping Paper	33	69

The following Ontario mills have capacities that are smaller than the mean less one standard deviation calculated for Ontario.

Company	Mill	Product	Capacity of Mill (Tons per Day)	Capacity, (from Table III-28) Mean less one standard de- viation for relevant product
Abitibi	Smooth Rock Falls	Kraft Pulp	340	438
Abitibi	Thunder Bay	Sulfite Pulp	100	168

Company	Mill	Product	Capacity of Mill (Tons per Day)	Capacity (from Table III-28) Mean less one standard deviation for relevant product
Domtar	Red Rock	Newsprint	200	270
		Kraft liner-board	550	65
Sunoco	Brantford	Paperboard	20	65
Georgia Pacific	Beaverwood Fibre	Newsprint	120	270
		Paperboard	190	65
IKO Industries	Brampton	Board and Insulation	50	65

The following additional mills have capacities lower than just the mean for the particular product group in Ontario.

Company	Mill	Product	Capacity (Tons per Day)	Mean Capacity of relevant product category
American Can	Marathon	Kraft market pulp	485	529
Abitibi	Sturgeon Falls	Sulfite pulp	225	261
	Smooth Rock Falls	Kraft market pulp	340	529
Kimberly- Clark	Terrace Bay	Kraft market pulp	425	529
Ontario- Minnesota	Kenora	Sulfite pulp	185	261
		Newsprint	740	124

TABLE III - 28

STATISTICAL SUMMARY OF MILL SIZE DISTRIBUTION

(tons per day)

Product		Canada	Ontario	Quebec	British Columbia	New Brunswick
Kraft Pulp	m	593	529	492	682	518
	s	212	91	189.7	258	
	#mills	33	8	5	15	3
Sulfite Pulp	m	284	261	262	440	300
	s	110.8	93	140		
	#mills	18	8	6	1	2
Newsprint	m	717	624	616	940	831
	s	186	354	425	675.8	
	#mills	40	10	21	5	2
Paperboard	m	202	236	214	185	
	s	179	171	197	182	
	#mills	35	9	13	7	
Fine and Wrapping Papers						
	m	176	244		100	
	s	143	175			
	#mills	18	7		2	

m = mean

s = standard deviation

#mills= number of mills

The foregoing analysis does not constitute evidence that these mills are economically unviable. It does indicate, however, which mills might be seriously affected by increased environmental costs or "a downturn in" sales or prices.

4. Vertical Integration, Diversification and Ownership Patterns

Vertical integration means that the various successive stages of production of a product are under the control of a single firm. The vertical stages for paper and paper-board production include logging or waste paper collection, pulp production, paper-making, converting operations (i.e. the manufacture of finished paper and cardboard products) and, finally, the wholesale and retail marketing of these products. An integrated mill may include the logging, pulping and paper-making stages. Non-integrated mills include those which make only market pulp and those which must buy all of their pulp for paper-making.

Vertical integration has several advantages for a firm. First, it insures that the firm has a supply of inputs and markets for its outputs. Secondly, vertical integration may lower costs by eliminating the profits of independent suppliers. Consolidating into a vertically integrated operation may also eliminate transportation and handling costs as well as certain other process steps. Finally, it allows the firm, in certain instances, to shift

its profits to a specific processing or production level which has special tax concessions. Vertical integration may also be a means of penetrating a new market or obtaining secure supplies of raw material.

Most of the larger, multi-mill companies in Ontario including Domtar, Abitibi, Kimberly-Clark, Canadian International Paper, Eddy and American Can of Canada, are fully integrated from logging to the marketing of finished paper products. These paper companies do not, however, appear to control the converting and marketing phases of the industry. Out of 121 converting establishments in Ontario, the large integrated pulp and paper companies apparently own only 25 of them.⁶⁷ Vertical integration can further mitigate against the ravages of market fluctuations on an individual mill by establishing captive markets through the acquisition of converting and marketing establishments.

A number of mills have subsidiary operations which produce different product lines and which are important sources

67

<u>Company</u>	<u>Converting Establishments in Ontario owned by paper manufacturers</u>
Domtar	9
American Can	1
Abitibi	3
Consolidated Bathurst	4
Continental Can	3
E.B. Eddy	1
CIP Containers	4
Kimberly-Clark	1

of revenue to the firm. Sawmills which produce lumber and chips for pulping are associated with the Eddy mill at Espanola, Great Lakes Paper at Thunder Bay, Abitibi at Smooth Rock Falls and the Anglo-Canadian Company mill at Dryden. The Ontario Paper Company at Thorold, a subsidiary of the Chicago Tribune, has a complex chemical extraction plant where alcohol, vanillin and salt cake are separated from the chemical pulping wastes. A chemical plant is also associated with the Anglo-Canadian mill at Dryden.

Paper companies which manufacture fine paper and paperboard generally have integrated forward into converting and marketing operations. Most of the fine paper merchants operating in Canada are owned by Abitibi, Rolland or Domtar. E.B. Eddy also markets fine papers. Besides the fine paper wholesalers owned by these four manufacturers, only two or three other firms compete for the provincial government's fine paper contract.

While some paper companies have even acquired newspaper publishers, publishers have more often purchased newsprint mills to ensure their own supply of newsprint. Representing the latter situation, Ontario Paper in Thorold is owned by the Chicago Tribune. Forty-nine percent of Spruce Falls Power & Paper Company is owned by the New York Times and 51 percent by Kimberly-Clark.

Foreign ownership of Canadian resource industries in general and of the pulp and paper industry in particular

has been the object of a recent study by the Legislative Assembly of Ontario.⁶⁸ According to this study, about 58 percent of the capital invested in the Canadian pulp and paper industry is foreign-owned, 51 percent of which is from the United States.⁶⁹ Approximately 50 to 55 percent of the assets of the industry are controlled by Canadians.⁷⁰ Most of the foreign-owned mills in Canada produce pulp or newsprint with few venturing into fine paper and paperboard operations. American investors favoured newsprint and pulp production facilities because there has been insufficient wood and plant capacity in the U.S. to satisfy that nation's demand for these products. Moreover, there were no tariffs on pulp and newsprint imports into the United States. Consequently, foreign owners account for 60 percent of the newsprint manufacturing capacity for all Canada.⁷¹

Table III-29 lists the mills in Ontario which are foreign-owned. It is clear that these facilities are primarily engaged in the production of pulp and newsprint. About 45% of the Kraft pulp capacity and 47% of the newsprint capacity

68 Kates, Peat, Marwick & Co. Foreign Ownership and Forest-Based Industries for the Select Committee on Economic and Cultural Nationalism of the Ontario Legislative Assembly (Toronto: J.C. Thatcher, Queen's Printer for Ontario, October 26, 1973).

69 Ibid, page 40.

70 Ibid, page 41.

71 Ibid.

TABLE III-29

PULP AND PAPER MILLS IN ONTARIO WHICH ARE FOREIGN OWNED

COMPANY	LOCATION	PRODUCT	CAPACITY TONS/DAY	COUNTRY OF ORIGIN
American Can Co.	Marathon	Kraft market pulp	485	U.S.A.
CIP	Hawkesbury	Dissolving Cellulose Fibre	270	U.S.A.
Dominion Cellulose	Toronto	Tissue	120	U.S.A.
Canadian Johns Manville	North Bay	Building Products	125	U.S.A.
Kimberly Clark	St. Catharines	Tissue	110	U.S.A.
	Terrace Bay	Bleached kraft pulp	425	
	Huntsville	Creped wadding	70	
	Kapuskasing	Creped wadding	75	
	Spruce Falls	Magnafite pulp	200	
		Sulfite pulp	365	
		Groundwood	900	
		Newsprint	1,000	
		Bleached sulfite market pulp	250	
Boise-Cascade	Fort Frances	Groundwood pulp	500	U.S.A.
		Kraft pulp	500	
		Bleached market kraft pulp	375	
		Market Groundwood pulp	180	
		Groundwood Speciality)	500	
		Newsprint		
	Kenora	Groundwood	250	
		Sulfite	185	
		Newsprint	740	

Continued...

TABLE III-29 (Continued)

COMPANY	LOCATION	PRODUCT	CAPACITY TONS/DAY	COUNTRY OF ORIGIN
Chicago Tribune (Ontario Paper Co.)	Thorold	Groundwood pulp	530	U.S.A.
		Sulfite Pulp	225	
		Newsprint	710	
		Market Sulfite Pulp	50	
Georgia Pacific (Beaverwood Fibre)	Thorold	Groundwood pulp	125	U.S.A.
		Waste paper pulp	190	
		Newsprint	120	
		Paperboard	190	
		Total	9765	

in the province are owned by foreign-based firms. Approximately 38 percent of the paper and paperboard production capacity (excluding newsprint) are also foreign-owned.

There seems to be a potential for even more foreign penetration of this industry. Japanese and European interests are reportedly examining the feasibility of new pulp mills in B.C. and the Maritimes. On the other hand, some foreign-owned mills have been purchased by provincial governments after financial difficulties have been encountered by the original owners.⁷² This option is certainly open to the Ontario government but has never been exercised.

The study of foreign ownership in the pulp and paper industry involved interviewing a sample of pulp and paper firms to determine whether there were differences in behavior between foreign-owned and Canadian-owned companies concerning the following issues: husbandry of forest resources, air and water pollution, research and development, large scale reduction in labor force and wages and benefits. Unfortunately, the sample was too small to draw statistically meaningful conclusions. However, with respect to those firms

⁷² The most important examples are Churchill Forest Industries in Manitoba, Labrador Linerboard in Newfoundland; and Columbia Cellulose and Crown Zellerbach's plant in Ocean Falls, British Columbia.

that were interviewed, there seems to be little difference in the attitude and behaviour toward environmental matters between foreign and Canadian companies. If anything, foreign-owned firms seemed to be more conscious and responsible concerning such areas as environmental and labour relations.

It seems that the primary effect of ownership is that publisher-controlled firms held up better during the general market declines of the late 1960's and recovered faster than other firms.⁷² This is to be expected since publishers are likely to purchase less newsprint on the open market and utilize the production of their own subsidiaries.

F. COMPETITIVE COST POSITION OF THE ONTARIO PULP AND PAPER INDUSTRY

1. Introduction

According to the Canadian Pulp and Paper Association, transportation costs and taxation are the two cost components which most seriously affect the competitive advantage of Canadian mills with respect to export markets.⁷³ These costs are claimed to be higher in Canada than in competing producing areas such as the United States and Scandinavia. The CPPA further contends that added environmental costs are beginning to burden the industry.⁷⁴ The industry has

⁷³ Canadian Pulp and Paper Association; Industry Review and Recommendations (Montreal: CPPA, December 6, 1971), p. 1.

⁷⁴ Ibid, p. 2.

also claimed that new mills which have been built with the aid of federal or provincial regional development programs, have contributed to an excess production capacity situation during periods of slack demand.⁷⁵

Mills in Ontario and Quebec are said to be further burdened by higher wood, labour and environmental costs than are pulp and paper operations elsewhere in Canada. A number of studies comparing costs in Ontario, Quebec, British Columbia, the southeastern United States and the Scandinavian countries have been reviewed.⁷⁶ It is fair to conclude that the relative cost advantages differ from region to region and tend to offset each other.

For example, labour costs in Scandinavia are below that of Canada but wood costs are substantially higher. Wood costs in the southern United States have been generally lower than in eastern Canada but are rising more rapidly.⁷⁷ Western Canada has lower wood costs but substantially higher wage rates than Ontario.

75 Ibid.

76 CPPA, op. cit. December 6, 1971; Private Planning Association of Canada, The Competitive Position of the Eastern Canadian Pulp and Paper Industry (Montreal: CPPPQ, January 1972); R.A. Daly & Co. Ltd., Research Dept., The Canadian Forest Products Industry - Equity Memo (Toronto: R.A. Daly & Co., January 1969).

77 W.E. Haviland, N.S. Takascy and E.M. Cape, op. cit., 1968.

The CPPA and others have proposed policy changes which are intended to make the pulp and paper industry in Canada more efficient and profitable.⁷⁸ The policy areas mentioned include taxes, freight rates, tariff and trade, labour costs, forest management and pollution control. It is also suggested that anti-combines legislation might be waived to allow joint ownership of larger, more efficient production facilities. This is referred to as "restructuring" or "rationalization" of the industry. All of the policy suggestions are explicitly or implicitly aimed at lowering costs at one stage or the other in the production process.⁷⁹

The validity or the accuracy of the various cost comparisons or the justification of the policy proposals will not be debated here. This is not to say that relative costs are unimportant to the well-being of the industry or that they should not be considered by government. The only point at issue is whether pulp and paper companies should be allowed to offset cost disadvantages in such factors as wood or labour by delaying compliance with pollution control programmes.

⁷⁸ CPPA, Industry Review and Recommendations prepared for a meeting with Ministers of the Government of Canada (Montreal: CPPA, 1971).

⁷⁹ Some policies are implicitly intended to achieve a greater degree of market power for newsprint manufacturers located in Eastern Canada. Provincial governments have long cooperated with their respective pulp and paper industries in efforts to fix prices and secure markets. The latest scheme, proposed in 1971-72, was a newsprint marketing consortium which would monopolize the sales of Eastern Canadian newsprint to the United States. This proposal was shelved as soon as the market improved.

Assuming that this policy is not permitted, the issue to which this study is directed concerns the extent to which pollution abatement costs alone will affect the competitive position of Ontario mills relative to producers in the United States, Scandinavia and other provinces in Canada.

Problems and policies concerning labour, wood, transportation, taxation and material costs are, in fact, more directly the concern of the industry itself and of other federal and provincial ministries.

In order to determine whether environmental policies will adversely affect the competitive position of Ontario mills, one must compare whether on-going and intended pollution control programs of the governments of Canada, Quebec, British Columbia, the United States and Scandinavia will impose the same general magnitude of costs on their respective pulp and paper industries as will those being contemplated for Ontario.

The remainder of this section will be devoted to a discussion of the estimated economic impacts of environmental programs in the United States, Sweden and Canada.

2. The United States

The 1972 amendments to the United States Water Pollution Control Act have specified that all industries, including pulp and paper, achieve effluent reduction consistent with three levels of technology:

- (1) the Best Practicable Control Technology
Currently Available, to be met by 1977.

- (2) the Best Available Control Technology Economically Achievable to be met by 1983.
- (3) Zero Discharge to be met by 1985.

Although these guidelines are not yet mandatory, they are highly significant in two respects. First, they are probably the most stringent water quality objectives yet announced by any government. Secondly, a timetable for compliance has been specified, a feature not found in environmental legislation elsewhere. Air quality legislation requires the industry to control air pollution emissions in a similar manner.

Estimates have been made of the financial costs which the U.S. paper industry is currently spending for environmental protection and what it will cost to achieve the objectives set by the Water Quality Act. The Best Practical Control Technology level of abatement is most comparable to the effluent objectives established for Ontario mills.

A survey of the current expenditures for pollution control by the U.S. pulp and paper industry was undertaken by the National Council of the Paper Industry for Air and Stream Improvement, Inc.⁸⁰ According to this

⁸⁰ National Council of the Paper Industry for Air and Stream Improvement, Inc. "A Survey of Pulp and Paper Industry Environmental Protection Expenditures and Accomplishments - 1971", Report No. 7301, January 1973, page 15

survey, the actual capital and operating costs of treatment and disposal of air, water and solid wastes averaged about \$2.39 per ton of paper and paperboard production during 1971. A breakdown of the actual average costs for each type of waste is presented in Table III-30. The survey revealed that the actual expenditures for wastewater treatment at different mills ranged from \$1.90 to more than \$5.00 per ton of output.⁸¹

It is very difficult to get meaningful expenditure figures for Ontario pulp and paper mills which can be used for comparisons. According to the Canadian Pulp & Paper Association, Ontario mills spent \$12.1 million on waste treatment facilities and equipment during 1971.⁸² On an annualized basis, the present value of these capital expenditures amounted to about \$0.40 per ton of output.⁸³

81 Ibid.

82 Canadian Pulp and Paper Association, Report on Effluent Conditions of the Pulp and Paper Mills in Ontario - Resurvey for Year 1971 (Montreal: CPPA, May 1972).

83 The \$0.40 per ton per year was calculated in the following manner.

Assumptions: (1) 25 year life of equipment = n
(2) 15% interest rate = i
(3) Production in 1971 = 13680 ton/day
(4) Annual debt repayment

Formula: $C(i(1+i)^n)/((1+i)^n - 1)$

where C = total capital cost (\$12,138,000)

Calculations: (1) $12,138,000 \times 0.1547 = \$1,877,748.6/\text{year}$
annualized capital expenditures.
(2) $13680 \times 345 = 4,719,600$ tons per
year output
(3) $\$1,877,748/4,719,600 \text{ ton} =$
\$0.3979/ton

TABLE III-30

AVERAGE ANNUAL COSTS OF ENVIRONMENTAL PROTECTION IN THE UNITED STATES PULP AND PAPER INDUSTRY, 1971⁽¹⁾ - \$ PER TON OF PRODUCTION

	<u>Other</u>	<u>Operating</u>	<u>Fixed</u>	<u>Admin.</u>	<u>TOTAL</u>
WATER				.05	
External to Process Treatment	1.00				
Internal to Process Loss Control	.65				1.70
AIR		.19	.29	.03	.51
SOLID WASTES		.091	.003		
Payments to Public Agencies	.051				.18
					<u>2.39</u>

(1) Annual costs include operating costs and annualized amortization, interest and depreciation on capital expenditures. These are fixed costs.

SOURCE: National Council of the Paper Industry for Air and Stream Improvement, Inc. A Survey of Pulp and Paper Industry Environmental Protection Expenditures and Accomplishments - 1971, Report No. 73-01, January 1973, p. 15.

This figure does not include annual operating costs. However, it is difficult to conceive of current environmental control operating costs exceeding \$1.00 per ton of product.

Cost of achieving the Best Practicable Control Technology Currently Available and Zero Discharge abatement objectives have been estimated for U.S. mills by Arthur D. Little, Inc.⁸⁴ The costs of the best practicable technologies were estimated on the basis of activated sludge or aerated lagoons. Zero discharge objectives could theoretically be achieved by adding a multiple stage flash evaporation, filtration and crystalization treatment sequence to the activated sludge or lagoon systems. Costs vary widely due to differences in mill size, water use and physical features. Average cost estimates, therefore, are not very meaningful except for purposes of comparison. Estimates of the ranges of such costs are perhaps more helpful. Hence, the additional costs of meeting the best practicable technology treatment level for sulfite mills are estimated to run from \$7.40 to \$19.20 per ton of sulfite pulp and between \$4.40 and \$11.60

⁸⁴ Arthur D. Little, Inc. Economic Analysis of Proposed Effluent Guidelines - Pulp, Paper and Paperboard Industry (Washington, D.C.: U.S. Environmental Protection Agency, September 1973), pp. C-6, C-8 and Appendix C-A. See also "Economic Impact of FWPCA Water Effluent Standards and Goals" Paper Trade Journal, April 1, 1974, page 36.

per ton of kraft pulp.⁸⁵ For newsprint mills, the best practicable treatment is expected to cost between \$3.00 and \$15.80 per ton of product.⁸⁶ For the entire paper and paperboard industry, the Best Practicable Control Technology was estimated to require \$925.6 million in capital investment and \$4.40 per ton in additional operating cost.⁸⁷ Cost estimates of treatment and chemical recovery systems for sulfite mills are summarized separately in Table III-31. As stated previously, this level of treatment would yield effluent roughly equivalent to the objectives set for Ontario mills by this Ministry.

By way of rough comparison, the CPPA estimated that it would require about \$685 million in capital expenditures to achieve federal water pollution control regulations for the whole Canadian pulp and paper industry.⁸⁸

85 "Economic Impact of FWPCA Water Effluent Standards and Goals", Paper Trade Journal, April 1, 1974, page 36.

86 Ibid

87 "Cost of Achieving EPA's BPCTCA and Zero Discharge", Paper Trade Journal, April 15, 1974.

88 CPPA, Environmental Control and the Pulp and Paper Industry of Canada, a Submission to the Government of Canada (Montreal: Canadian Pulp and Paper Association, December 17, 1971), page 4.

TABLE III-31

SULFITE PULP WASTE LIQUOR TREATMENT AND CHEMICAL RECOVERY
CAPITAL AND OPERATING COST RANGES ⁽¹⁾

Cooking Liquor Base	Pulp Yield (%)	Fixed Capital Investment (\$000/Ton/Day)		Operating Cost ⁽²⁾ (\$ per Ton Output)	
		Mill Capacity		Mill Capacity	
		100 T/day	700 T/day	100 T/day	700 T/day
Sodium ⁽³⁾	48	13	7	16.70	8.80
	72	8	4	11.70	4.80
Ammonia	44	35	21	11.80	0.50
	72	24	15	12.50	3.00
Magnesium	47	43	25	8.10	(8.10) ⁽⁴⁾
	60	36	21	15.00	.10

(1) Mid-1971 Capital and Operating Costs

(2) Includes depreciation and interest

(3) Na₂SO₄ by-product

(4) Credit

SOURCE: Arthur D. Little, Inc. Economic Analysis of Proposed Effluent Guidelines: Pulp, Paper and Paperboard Industry
(Washington, D.C.: U.S. Environmental Protection Agency, September 1973), p. c-8.

This amounts to about \$2.42 per ton of output. Operating costs could add as much as \$2.50 per ton of product to the cost of paper for a total of about \$4.92 per ton.⁸⁹ Given the margin for error in all of these estimates, it does not appear that the burden of environmental costs will be substantially different between the U.S. and Canadian pulp and paper industries.

Implementation of the Best Practicable Control Technology is not expected to have a serious impact in the competitive position of U.S. paper makers with respect to export markets.⁹⁰ Enforcement of the Best Available Control Technology or Zero Discharge abatement levels is expected to make U.S. sulfite pulp and paper products less competitive on the world market, particularly with respect to Canadian producers.⁹¹

According to analyses of the impacts of these costs made by Arthur D. Little, Inc., the product groups most affected by the increased environmental costs in terms of mill closures are sulfite and semi-chemical pulps, tissue paper, printing and writing paper, special industrial papers

89 Ibid, page 5

90 Arthur D. Little, Inc., op. cit., September 1973, page B-13

91 "Economic Impact of FWPCA Water Effluent Standards and Goals", Paper Trade Journal, April 1, 1974, page 38

and combination paperboard.⁹² The firms likely to be hardest hit are the unintegrated specialized paper and board mills which are not hooked up to municipal sewers. All but about four of the mills in Ontario are integrated pulp and paper mills producing either newsprint or a wide variety of paper or board products.

3. Sweden

Sweden is the Atlantic community's third largest pulp producer as well as the third largest exporter of pulp and paper products. In 1971, pulp and paper accounted for about 8 percent of Sweden's total export earnings. Pulp and paper, therefore, occupies a position in Sweden's economy similar to that in Ontario.

Sweden has made a commitment to environmental quality in the form of its Environmental Protection Act of 1969. Under the Act, present or potential polluters are required to obtain a permit or an "exemption" which sets the conditions for carrying on polluting activities. Standards are established in the permit or the exemption. The Act did allow existing plants belonging to major exporting industries such as pulp and paper a five-year

⁹² U.S. Environmental Protection Agency, Economic Analysis of Proposed Effluent Guidelines - Pulp and Paper and Paperboard Industry. (Washington, D.C.: EPA, September 1973), page B-7.

transition period in which to meet the standards set by the regulating agencies. New facilities are required to meet all restrictions.

Forest industries in Sweden, along with iron and steel, will have to spend the most to install adequate pollution control in existing plants. Between 1969 and 1973, the Swedish pulp and paper industry invested more than 660 million Swedish Krona or about \$146 million on water and air pollution control in older mills.⁹³

The Organization for European Cooperation and Development estimated that, by 1975, pollution control costs in Sweden will come to about 3 percent of the average price of pulp and paper products.⁹⁴ By this time, pollution control costs in Canada are expected to amount to about 2.9 percent of the average prices of paper products.⁹⁵

The Swedish Environmental Protection Act also provided for subsidies for certain existing industrial plants over the five-year transition period (1969-74). Since over half of Sweden's industrial output was exported, the government obligated itself to ensuring that implementation

⁹³ Lennart J. Lundqvist, Environmental Policy of Sweden in relation to the "Guiding Principles". Preparatory meeting of Experts in Stockholm, October 29 to October 31, 1972 (mimeo) Paris: Organization for Economic Cooperation and Development, October 4, 1973, pp. 19, 20.

⁹⁴ Arthur D. Little, Inc. op. cit. September 1973, p. VII-7

⁹⁵ Ibid

of the Environmental Protection Act did not adversely affect the international competitiveness of the primary export industries such as pulp and paper. Grants were given only to establishments in operation prior to 1969 and generally amounted to 25 percent of the environmental investment. The proportion of government support could go as high as 75 percent. During the years 1969 to 1973, the government subsidies accounted for 38 percent of the total environmental investments made by the pulp and paper industry.⁹⁶

The subsidies have expired and it is expected that the long run costs for environmental protection which will have to be borne by the Swedish pulp and paper industry will be equivalent to those in Ontario.

4. Canada

Of particular concern is Ontario's competitive position vis-a-vis other pulp and paper producing provinces, especially British Columbia and Quebec. B.C. market pulp does compete to a certain extent in markets supplied by Ontario mills. However, the British Columbia government is preparing air and water effluent guidelines for the pulp and paper industry which will require virtually complete abatement of air and water pollution from this industry.

⁹⁶ Lennart J. Lundqvist, op. cit., 1973, p.20

The cost burdens will be necessarily less to pulp and paper mills in B.C. because most are relatively new and are designed to reduce waste effluent through recycling, materials recovery and increased productivity.

Mills in Quebec are, like those in Ontario, old and extremely expensive to clean up. While Quebec may have less stringent environmental standards than Ontario, it is not altogether accurate to refer to the province as a pollution haven. The Quebec Water Board has published directives for reducing air and water pollution from the industry and has established effluent objectives.⁹⁷

The pulp and paper industry is even more important economically to Quebec than it is to Ontario so that pollution abatement enforcement has been proportionately restrained. It does not appear, however, that Quebec mills will gain a significant cost advantage over Ontario mills only as a result of environmental policies. Differences in labour and wood costs are more important determinants of cost advantages.

Furthermore, based on the statements and documentation of the industry, the availability of wood resources rather than environmental restrictions, is an over-riding

⁹⁷ Fikret Berkes, Bruce Ott, Michael J.A. Butler and William A. Ross, eds. Environmental Aspects of the Pulp and Paper Industry in Quebec, 2nd Ed. (Montreal: McGill University 1972), pp. 50-55.

factor in mill location at present. A mill must have an assured supply of the correct wood species at a specific location before it can pack up and move to a new site.

Federal water pollution control regulations for pulp and paper mills have been published (see Section 1 of Appendix C). While the Federal Government has, to date, left the enforcement of air and water pollution control to the provinces (see Chapter II), it does have the authority to impose its regulations on pulp and paper mills that pollute rivers, lakes or ocean waters which support fish life. As with the provinces, it is unlikely that the Federal Government will close any of the old, polluting mills. However, it is equally unlikely that Federal authorities will permit the construction or expansion of a mill that does not meet its regulations.

It is clear that the pulp and paper industries in both the United States and Sweden face tough anti-pollution requirements and substantial costs, especially in their older establishments. Other provinces and the Federal Government in Canada have also made a commitment to environmental improvement in this industry. While the short-run costs and incidence of adjustments differ in each country, all will eventually have to bear the long run costs of environmental protection. In fact, those

who complete their abatement programs first are likely to gain a distinct competitive advantage over those mills who delay as the costs of installing the control measures continue to rise.

G. COMPETITION IN THE PULP AND PAPER INDUSTRY

The degree of competition in the industry will have an important bearing on the impacts which pollution control costs will have on prices and the level of output. A brief discussion of the competitive characteristics of the pulp and paper industry in Canada and the United States is, therefore, presented in this section.

The competitive structure of the pulp and paper industry in Canada and the United States can be classified as an oligopoly. No one firm controls any of the relevant markets but the actions of a single company can affect the policies of other firms. The various structural characteristics which result in this particular competitive structure include the inelastic and cyclical demand for paper products; the high ratios of fixed to variable costs, economies of scale and high capital barriers to entry; and an elastic supply when excess capacity exists with an inelastic supply under equilibrium or excess demand circumstances.

As a result of these characteristics, price and production policies of pulp and paper manufacturers in both the United States and Canada have often been directed toward reducing price competition. The newsprint sector has been most active in this respect. A number of newsprint

producer organizations have been formed in the past with the purpose of stabilizing prices and insuring "orderly" markets. Those organizations established in Canada often had the blessing and help of the governments of Quebec and Ontario. The newsprint marketing consortoriums proposed during the latest market slump (1970-1972) for eastern Canadian newsprint manufacturers is only the latest in the long history of government - industry schemes to limit price competition. With respect to newsprint, these efforts have consistantly failed for several reasons.

First, newsprint customers are large and organized and have been successful in countering collusive arrangements through bargaining, acquisition of their own paper mills and the enforcement of anti-combines legislation. Secondly, profitability depends on the extent to which plant capacity is utilized. During weak markets, firms find it difficult to resist the temptations to break away from cartel agreements and try to increase sales, operating ratios and profits by discounting prices. During strong markets and no excess capacity there is little incentive to establish a cartel in order to operate at profitable levels. The performance of the newsprint market appears to be competitive over the long run despite the attempts to restrict price competition by manufacturers and provincial governments. There has been a measure of success at maintaining price

stability in newsprint markets but at the expense of fluctuating production levels, operating ratios and profits. These characteristics are illustrated in Figures III-9, III-10 and III-11.

The methods of limiting price competition which paper companies have used or are now using include price leadership, base-point pricing, uniform plans and trade associations. Fine papers and tissue paper manufacturers are in a particularly favourable position to curtail price competition for their products here in Canada. These markets are concentrated on the supply side while buyers are small and many. Prices have been generally stable and growing steadily for years. (Note Figures III-12 and III-13). Canadian producers are also protected by tariffs although recent multi-lateral tariff reductions have appeared to stimulate Canadian export demand for fine papers.

While Canadian consumers do not appear to have been exploited by paper manufacturers, certain sectors of the industry have a history of working to gain market power, restrict price competition and stabilize markets. To a certain extent, the newsprint, fine papers and tissue paper sectors have been successful at gaining some market power. However, tariff reductions, market growth and the propensity for individual firms to periodically diverge from production or price agreements when the market suffers recessions, have all acted to offset these efforts at market control. The data shows, however, a consistent pattern of stable

or rising prices for these particular products. The conclusion is that the fine paper, wrapping paper, tissue paper and, to a limited extent, the newsprint sectors of this industry have enough market power to prevent cyclic movements of prices. It is likely, therefore, that cost increases resulting from pollution abatement in these product sectors can be passed on to customers over the long run with impunity.

H. PROFITABILITY

1. Introduction

The pulp and paper industry has consistently maintained that the cost burden of curtailing and treating waste effluents produced by their mills will seriously weaken many companies, even if they are provided with reasonable time in which to implement programs. Claiming financial distress, paper companies have delayed or refused outright to spend the money needed to abate air and water pollution in their mills. The Ministry of the Environment has been reluctant to prosecute mills under the Ontario Water Resources Act for fear of precipitating closures or lay-offs. Ministry regulatory officials are thus forced to negotiate and to bargain with each mill in order to get them to agree to control programs. However, mills have been able to delay implementation of programs by claiming that they could not afford the additional expense, that they had no funds available for pollution control or that they needed additional time for more study.

In one approach to the problem, it was thought

that knowledge of the profitability condition of each mill would enable the Ministry to estimate how much a particular mill can afford to spend on pollution abatement. Regulatory officials could then go ahead with prosecutions if a mill, which could otherwise afford compliance, balked at implementing Ministry-approved abatement programmes.

However, knowledge of each mill's up-to-date financial situation is not likely to facilitate the Ministry's efforts at pollution abatement in the pulp and paper industry for three reasons. First, such knowledge in itself does not constitute an incentive for the firm to alter its behaviour. Secondly, firms have their own ideas and obligations concerning the disposition of their profits, whether or not the government knows exactly how much these profits are. The government is still faced with the problem of inducing firms to spend the money on pollution control. Finally, profits are not the only measure nor are they the best measure of a firm's ability to afford pollution control costs. The key to the whole process is to provide an economic incentive that will move the firms to action.

While knowledge of each mill's financial situation might not be an effective pollution abatement policy instrument, such information is useful in evaluating the incidence and the magnitude of the economic impacts of environmental policy alternatives on the industry. Accordingly, an analysis of

profitability at the industry, company and mill levels will be undertaken in this section. The analysis will also help to identify those mills which might close under different environmental policies. It is hoped that the information developed in this analysis will provide an added perspective and background for those Ministry officers who must evaluate the claims and the representations of individual companies and industry spokesmen.

2. Data Limitations

A detailed record of the costs and revenues of individual mills is collected each year by Statistics Canada as part of the Annual Industrial Census. These data include costs of energy, fuels, materials, production management, labour and services as well as the value of shipments and services performed. Depreciation, interest and other fixed charges are not recorded, so that only variable cost data are, in fact, available. Unfortunately, the Canada Statistical Act provides that data for an individual establishment is confidential unless the owner gives permission for its release. Officials of the Ontario Statistical Centre (TEIGA) were very reluctant to ask for releases because they thought it would give firms grounds to refuse providing data for future censuses. The data could, therefore, only be released in aggregated form so as to avoid disclosure of establishment figures.

Another limitation concerning the Industrial Census is that the data is at least two years out of date by the time the forms have been processed and the reports printed. The latest data available for this analysis was for 1971.

Production data for individual mills are available from various sources, notably Lockwood's Directory and engineering consultants' reports filed with the Ministry of the Environment. The Canadian Pulp and Paper Association collects some production, cost and capacity data from its member firms. Prices indices for pulp and paper products are available from Statistics Canada while actual price data must be gleaned from trade journals, newspapers and company price lists.

Information concerning the financial strength of individual firms was obtained from the annual reports of the companies and from Dunn and Bradstreet, Ltd. These data are limited, however, to the extent that U.S. companies do not disaggregate their Ontario, or even their Canadian, operations from their combined financial statement. Moreover, these sources provide no information concerning the financial condition of individual mills.

3. Procedure

The profit picture for the aggregate pulp and paper industry and for the firms which own mills in Ontario

will be described first. This information is available from published sources.

The profitability of individual mills will be examined in the following manner. Industrial Census cost and revenue data for individual establishments are confidential so aggregated data for five different categories of mills were obtained. The data consisted of the actual costs and revenues incurred by the mills during 1971, the latest year for which data was available. Costs and revenues for individual mills were estimated from this data on a per ton basis. Costs were updated by the average percent increase in various cost components from 1971 to 1974. Current prices constitute the average revenue for each paper product. The ratio of depreciation and interest charges to total variable costs was calculated for each paper company from data in their annual reports. Fixed costs were then estimated as a percent of the variable costs of each mill.

4. Profitability of the Pulp and Paper Industry

There are several ways of measuring the profitability of a firm. Gross profits or "earnings" are the surplus of revenues over the sum of variable costs (labour, materials, fuel, etc.) and fixed costs (depreciation and interest). Deduction of income taxes yields net profits. Cash flow, i.e., the sum of net profits plus depreciation and depletion allowances, is a relevant measure of profitability

because it defines the amount of funds which the firm has at its disposal each year. Extraordinary or non-recurring income or losses are excluded from profit figures since it is the profitability of the pulp and paper manufacturing operations of the industry or firm which is of concern here. Changing accounting practices and different rates of capacity utilization over the years tend to distort comparisons of reported profit rates over time. Hence, this analysis will be confined to profit data of the past five years.

Net (after-tax) profits and cash flows for the principle pulp and paper companies operating in eastern Canada are presented in Table III-32. These data are derived from the annual reports of the respective companies. Data concerning the Ontario operations of these firms are not available.

In order to compare the profitability of different firms over time, profits are expressed as ratios or rates of return. Table III-33 shows the ratios of after-tax profits but excluding extraordinary income to the capital employed for the two primary segments of the Canadian pulp and paper industry and for selected firms with mills in Ontario. The profit per dollar of capital employed is a measure of the return on investment and is an indication of long term profitability. Table III-34 presents the profit per dollar of sales for the same firms and industry segments. This

TABLE III-32

PROFITS OF PULP AND PAPER COMPANIES
IN CANADA

COMPANY	Net Profits excluding extra-ordinary items (\$000)	Cash Flow Total	Total Pulp and Paper Production for year (000 Tons)	Net Profit per ton (\$/Ton)
<u>Canadian Companies with no Mills in Ontario</u>				
B.C. Forest Products				
1970	1,336			
1971	5,455	N/A	N/A	N/A
1972	10,823			
Consolidated Bathurst				
1970	589			
1971	443	N/A	N/A	N/A
1972	6,497			
MacMillan Bloedel				
1970	17,400			
1971	22,000	N/A	N/A	N/A
1972	35,100			
Price Co.				
1970	3,835			
1971	1,200	N/A	N/A	N/A
1972	6,664			
Rolland Paper Co.				
	- 422 (loss)			
	150	N/A	N/A	N/A
	1,389			

Continued...

TABLE III-32 (CONTINUED)

COMPANY	Net Profits Excluding Extra-Ordinary Items (\$000)	Cash Flow Total	Total Pulp and Paper Production for Year (000 Tons)	Net Profit per ton (\$/Ton)
<u>Canadian Companies with Mills in Ontario</u>				
Abitibi				
1970	5,032	21,000	1,409.5	3.57
1971	4,123	20,800	1,498.9	2.75
1972	8,516	25,100	1,348.7	6.31
Domtar ⁽¹⁾				
1970	17,600	42,800	1,491.4	7.67
1971	(11,440) 10,500	41,000	1,433.8	4.76
1972	(8,825) 17,468 (11,354)	49,600	1,408.5	8.06
Great Lakes Paper				
1970	4,345	9,960	519.8	8.36
1971	3,237	9,700	506.6	6.39
1972	1,608	8,500	504.8	3.19
Anglo-Canadian (Dryden) ⁽²⁾				
1970	2,413	8,100	--	--
1971	3,113	7,700	817.2	2.59
1972	2,556	8,100	858.0	2.98

(1) About 65 percent of Domtar's sales is pulp and paper products. It is assumed that 65 percent of the profits are also derived from pulp and paper. The 65 percent figures given in brackets were used to calculate the net profit per ton of output.

(2) Dryden pulp and paper company accounts for about 43 percent of Anglo-Canadian's total sales. Pulp and paper products constitute about 95 percent of Anglo-Canadian's total sales. The full amount of earnings is, therefore, used to calculate profit per ton.

Continued...

TABLE III-32 (CONTINUED)

COMPANY	Net Profits Excluding Extra-Ordinary Items (\$000)	Cash Flow Total	Total Pulp and Paper Production for Year (000 Tons)	Net Profit per ton (\$/Ton)
U.S. Companies with Mills in Ontario				
International Paper ⁽³⁾				
1970	82,000 (42,640)	132,000	6,968	6.12
1971	69,000 (35,880)	151,000	8,677	4.14
1972	103,000 (53,560)	201,000	7,189	7.45
1973	160,000 (83,200)	264,000	7,117	11.69
American Can				
1970	65,893	138,600	N/A	N/A
1971	50,135	123,200	N/A	N/A
1972	55,261	130,000	N/A	N/A
Kimberly-Clark Ltd.				
1970	38,315	78,800	N/A	N/A
1971	31,688	75,000	N/A	N/A
1972	55,000	95,300	N/A	N/A

(3) 52 percent of International Paper's sales are derived from pulp and paper products. Estimated contribution of pulp and paper to total earnings are presented in brackets. These figures were then used to determine the profit per ton.

SOURCES: Canadian Companies with no mills in Ontario: "Profits after Taxes; Pulp and Paper Companies", (mimeo) Canadian Pulp and Paper Association, August 24, 1973. All other firms listed. Annual Reports of the respective Company.

TABLE III-33

RATIO OF PROFITS AFTER TAXES TO CAPITAL EMPLOYED
FOR FIRMS WITH MILLS IN ONTARIO ⁽¹⁾

(per cent)

	1969	1970	1971	1972	1973
<u>Total Manufacturing in</u> <u>Canada</u>	5.5	4.6			
<u>Canadian Pulp and Paper Industry ⁽²⁾</u>					
Pulp and Paper Mills	3.4 (5.9)	2.3 (3.3)			
Boxes and Bags	6.7 (13.0)	5.6 (11.2)			
<u>Canadian Companies ⁽²⁾</u>					
Abitibi	3.6	1.3	1.4	2.4	
Domtar	3.7	2.3	.4	3.0	
Great Lakes Paper	6.2	6.5	4.4	2.1	
Anglo-Canadian (Dryden)			2.5	2.6	
George Weston (E.B. Eddy)	4.7	4.8	5.2	8.7	
<u>U.S. Companies ⁽²⁾</u>					
International Paper		4.6	3.8	5.6	8.3
American Can			3.9	4.5	
Kimberly-Clark		4.6	4.0	6.8	

(1) Capital employed is equal to the total liabilities and equity minus total current liabilities.

(2) Profit data is net profits before extra-ordinary income or losses. The figures in brackets indicate the rate of return after extra-ordinary items are included.

SOURCES: Statistics Canada, Corporation Financial Statistics, 1970 Catalogue 61-207 (Annual) (Ottawa: Statistics Canada, 1973), p.p. 81-82, 103. Annual Reports of specified companies.

TABLE III-34

RATIO OF PROFITS AFTER TAXES TO SALES
FOR FIRMS WITH MILLS IN ONTARIO

	(per cent)				
	1969	1970	1971	1972	1973
Total Manufacturing in Canada	3.9	3.1			
<u>Canadian Pulp and Paper Industry</u>					
Pulp and Paper Mills	4.8	3.4			
Boxes and Bags	3.3	3.0			
<u>Canadian Companies</u>					
Abitibi	4.2	1.6	1.7	2.8	
Domtar	3.6	2.9	.3	2.4	5.0 ⁽¹⁾
Great Lakes Paper	6.2	5.3	3.9	2.0	
Anglo-Canadian (Dryden)			2.2	2.1	7.5 ⁽¹⁾
George Weston (E.B. Eddy)	1.7	1.6	1.6	2.6	2.1 ⁽¹⁾
<u>U.S. Companies</u>					
International Paper	6.5	4.4	3.5	4.9	6.9
American Can	3.7	3.5	2.6	2.7	3.9 ⁽¹⁾
Kimberly-Clark	6.0	4.4	3.4	5.5	

(1) Based in first 9 months of year.

SOURCES: Statistics Canada, Corporation Financial Statistics, 1970 Catalogue 61-207 (Annual) (Ottawa: Statistics Canada, 1973), p.p. 81-82, 103; Annual Reports of Specified Companies.

ratio is an indication of the firm's current profitability. The return on capital is the more significant of the two measures with respect to a firm's long range planning. Table III-35 lists the cash flow as a percent of capital employed. This ratio expresses actual amount of income not committed to wages or materials which is generated per dollar of invested capital. Cash flow is more indicative of the amount of money a firm has available for investment than is profit.

The data in Tables III-33 and III-34 indicate that for the years 1969 and 1970, the rates of return for pulp and paper mills and for bag and box converters are somewhat lower than the average for all manufacturing in Canada. This is a consequence of the period of recession which the pulp and paper industry has gone through over the past four years. Canadian firms appear to have felt this recession somewhat more severely than their American counterparts who, besides being larger, are decidedly more diversified. Indeed, the concern over falling profits in 1971 prompted one securities analyst to recommend that investors divest themselves of eastern Canadian paper company stocks as Abitibi, Domtar and Consolidated Bathurst.⁹⁸ Most firms have, however,

⁹⁸ Ross Hay-Roe "The Eastern Canadian Newsprint Industry", Mills, Spence and Co. Ltd., April 20, 1974.

TABLE III-35

RATIO OF CASH FLOW TO CAPITAL EMPLOYED
FOR FIRMS WITH MILLS IN ONTARIO⁽¹⁾

	(per cent)				
	1969	1970	1971	1972	1973
Total Manufacturing in Canada	9.9	9.7			
<u>Canadian Pulp and Paper Industry</u>					
Pulp and Paper Mills	7.8	6.6			
Boxes and Bags	12.0	10.3			
<u>Canadian Companies</u>					
Abitibi	8.43	6.05	6.01	7.22	
Domtar	9.94	9.10	9.13	10.96	
Great Lakes Paper	12.68	12.97	13.11	11.65	
Anglo-Canadian (Dryden)	21.41	21.66	20.21	19.24	
<u>U.S. Companies</u>					
International Paper	12.26	7.46	8.36	11.02	13.75
American Can	10.96	11.53	9.63	10.66	
Kimberley-Clark	11.26	9.55	9.48	11.69	

(1) Cash Flow is equal to the sum of profits (after taxes) plus depreciation and depletion.

SOURCES: Statistics Canada, Corporation Financial Statistics, 1970 Catalogue 61-207 (Annual) (Ottawa: Statistics Canada, 1973), p.p. 81-82, 103; Annual Reports of Specified companies.

exhibited improvements in their profit performances during 1972 and 1973. The profit data for U.S. firms are those of the parent company and do not necessarily reflect the profitability of their Canadian subsidiaries.

Industrial Census data on the costs and revenues incurred in 1971 were obtained for five product categories. The mills included in each of these product categories are listed in Table III-36 along with capacity, production, pulp wood consumption and employment data for each establishment. The actual data are summarized in Table III-37. The Industrial Census collects only variable costs: fuel, wood, materials, services, wages and salaries. Fixed costs such as depreciation, interest and other financial costs are not recorded in the Industrial Census. The cost data from the Industrial Census had to be adjusted by calculating fixed costs as a percent of variable costs from data in the Annual Reports of each company. The average of this percentage is currently about 10 percent. This figure will be used although it is likely that many of the older mills would be almost fully depreciated and would have substantially lower debt payments than would newer mills.

The next step is to up-date these costs and revenues. Costs are handled in the following manner. Table III-38 shows the changes that have taken place in several cost components from 1971 through to mid 1974.

TABLE III-36

MILLS AND PRODUCT CATEGORY FOR WHICH COST AND REVENUE DATA ARE PROVIDED

Mill	Location	Product	Capacity tons/day	Production		Average Daily pulp- wood use(2) (000 cft.)	Mill Employ- ment
				1971 Tons/Day	1972 (1) Tons/Year (2)		
Bleached Kraft Market Pulp							
Abitibi	Smooth Rock Falls	Bleached kraft Market pulp	340	342 (117,500)	326	53.5	370
American Can	Marathon	"	485	482 (178,000)	469	52.7	750
Dryden (Anglo- Canadian)	Dryden	" Kraft papers	630	429 (103,000) 203 (64,600)	582	97.7	750
Eddy Forest Products (Weston)	Espanola	Bleached kraft Market pulp Kraft papers	650	473 (165,000) 91 (45,000)	673	100.0	970
Kimberly- Clark	Terrace Bay	Bleached kraft Market pulp	425	423 (147,000)	435	59.9	460
Newsprint, Mg Base Sulfite Pulp							
Great Lakes Paper	Thunder Bay	Newsprint	1,200	1,190 (340,516)	(338,526)	187.0	1,300

Continued...

TABLE III-36 (CONTINUED)

Mill	Location	Product	Capacity tons/day	Production 1971		Average Daily pulp- wood use (2) (000 cft.)	Mill Employ- ment
				Tons/Day	1972 (1) Tons/Year (2)		
Ontario- Minnesota (Boise- Cascade)	Kenora	Mg. sulfite pulp	300	85			
		Kraft pulp	550	457 (166,073)	749 (166,244)		
Spruce Falls Pulp and Paper Co. (Kimberly- Clark and New York Times)	Kapuska- sing	Newsprint	740	737 (274,100)	749	79.5	925
		Sulfite pulp	185				
		Groundwood	250				
		Newsprint Bleached sulfite Market pulp	1,000 365	996 218 (76,000)	935 203	126.2	1,480
Newsprint, Na Base Sulfite Pulp	Abitibi	Magnifite pulp Groundwood	200 900				
		Newsprint	375	356 (130,000)	337	32.0	300
Iroquois Falls	Iroquois Falls	Newsprint	935	953 (330,000)	955		1,600

Continued...

TABLE III-36 (CONTINUED)

Mill	Location	Product	Capacity tons/day	Production		Average Daily pulp- wood use(2) (000 cft.)	Mill Employ- ment
				1971 Tons/Day	1972 (1) (2)		
		Wrapper	45	44 (16,200)	45		
	Port Arthur, Thunder Bay.	Newsprint	460	458 (160,890)	445 (151,000)		375
Ontario Paper Co. (Chicago Tribune)	Thorold	Newsprint	710	707 (222,000)	670		1,400
		Na Sulfite pulp	225	28 (25,000)	44		
Fine Papers							
Domtar	Cornwall	Kraft pulp	400	186 (125,000)		68	1,800
		Fine papers	620	438 (170,000)	626		
Abitibi	Thorold	Fine papers	250	207 (75,000)			850
	Thunder Bay	Fine papers	270	275 (85,000)	278		850
Paperboard							
Beaver Wood Fibre (Georgia- Pacific)	Thorold	Paperboard	120	188 (70,000)		10.6	400

TABLE III-36 (CONTINUED)

Mill	Location	Product	Capacity Tons/Day	Production		Average Daily pulp- wood use (2) (000 cft.)	Mill Employ- ment
				1971 Tons/Year	1972 (1) (2)		
Miller Bros. Co.	Glen Miller	Newsprint	190	111 (35,000)			
		Paperboard	100	97 (34,400)			160
Domtar	Red Rock	Kraft Liner- board	550	547 (200,000)		196.9	700
		Newsprint	200	197 (70,900)			

(1) SOURCE: Canadian Pulp and Paper Association; Report on Effluent Conditions of the Pulp and Paper Mills in Ontario - Resurvey for the Year 1972 (Montreal: CPPA, September 1973).

(2) SOURCE: Lockwood Publishing Corp., Lockwood's Directory of Pulp and Paper Mills 1971/72 (New York: Lockwood Publishing Corp., 1972).

TABLE III-37

SUMMARY OF ACTUAL COST AND REVENUE DATA FOR AGGREGATED MILLS, 1971

Type of Mill	No. of Mills	Million of \$						Revenue From Other Products & Sources	Total Revenue
		Fuel Costs	Total Materials Costs	Wages and Salaries	Total Variable Costs	Revenue From Primary Products	Revenue From Other Products & Sources		
Bleached Kraft Market Pulp	5	8.98	72.8	32.1	113.8	103.9	28.5	132.4	
Newsprint, Mg Base Pulp	3	13.4	69.4	34.0	116.8	123.8	40.8	164.6	
Newsprint, Na Base Pulp	4	8.97	43.1	31.4	83.5	89.2	12.4	101.6	
Fine Papers	3	6.8	45.98	27.7	80.5	83.5	14.3	97.8	
Paperboard	4	5.6	26.1	11.5	43.2	42.8	14.4	57.2	

SOURCE: Industrial Census, 1971.

TABLE III-38

CHANGES IN COST COMPONENTS FOR
THE PULP AND PAPER INDUSTRY, 1971-1974

Component	Annual Index (1961=100)		Latest Date Available	Percent Change 1971 - Latest Date
	1971	1973		
1. Petroleum and Coal	113.9	132.4	April '74 158.1	44
2. Diesel Fuel	119.0	143.4	April '74 171.5	52
3. Industrial Chemicals	122.2	103.5	April '74 129.2	7
4. Forestry Machinery (1968=100)	109.3	117.0	March '74 125.1	16
5. Wages and Salaries (Paper and Allied Products) Average weekly wages	166.75		Dec. '73 206.85	24
Average hourly wages	3.88		Dec. '73 4.85	25

SOURCE: Statistics Canada, Canadian Statistical Review
(Ottawa, Statistics Canada (monthly)).

These cost components have increased by an average of about 30 percent. Therefore, the data recorded for 1971 were augmented by 30 percent to account for inflation.

Revenues were up-dated in the following manner. For homogeneous products such as newsprint or kraft market pulp, the current price is representative of the average revenue now being received by the mill. These prices are presented in Table III-39. Fine papers, paperboard and tissues are, however, produced in many different grades with no single price representing the product group. The industrial selling price indexes indicate how much the average prices of these product groups have risen between 1971 and the present. For each of these product groups, the average per ton value of shipments was increased by the percentage rise in the selling price index which has occurred since 1971. The estimated average revenue figures are included in Table III-39.

The costs, revenues and the gross profits per ton for 1971 and 1974 for each product category are shown in Table III-40. The information in this Table reveal two important facts. First, even when a relatively high estimate for fixed costs was added to the actual variable costs in 1971, the magnesium base newsprint, fine paper and paperboard mills were enjoying a profit margin of \$20.00 per ton or more, and this was during a period of relative recession. Secondly,

TABLE III-39

CURRENT PRICES AND AVERAGE VALUES OF
VARIOUS PULP AND PAPER PRODUCTS

Product	Average Value of Shipments 1971 ⁽¹⁾ (\$ per ton)	Percent Increase 1971-1974 in price index ⁽²⁾	Current Price or Estimated Average Value 1974 (\$ per ton)
Bleached Kraft Market Plup			265 ⁽³⁾
Newsprint			235 ⁽³⁾
Fine and Bond Papers	320	13	360
Wrapping and Packaging	213	8	229
Tissue and Sanitary Papers	275	7	295

(1) Statistics Canada, Pulp and Paper Mills, 1971 (Ottawa: Statistics Canada, 1973), page 12.

(2) Statistics Canada, Prices and Price Indexes (monthly) (Ottawa: Statistics Canada)

(3) Contract prices, summer 1974.

TABLE III-40

COMPARISON OF AVERAGE PROFIT MARGINS

1971 and 1974

\$ Per Ton

Type of Mill	1971			1974				
	COSTS			COSTS				
	Avg. Variable Costs	Est. Fixed 10% AVC	Total (1)	Avg. Total Revenue	Est. Profit Margin	Avg. Variable Costs	Est. Fixed 10% AVC	Current Price or Avg. Value
Bleached Kraft Market Pulp Mills	139	14	153	161	8	179	18	265
Market pulp production, 1971 - 710,900 tons								
Total production, all products, 1971 - 819,900 tons								
Newsprint Mg Base	98	10	108	138	30	127	13	235
Newsprint production, 1971 - 949,616 tons								
Total production, all products, 1971 - 1,191,689 tons								
Newsprint, Na Base Mills	94	9	103	115	12	122	12	235
Newsprint production, 1971 - 842,890 tons								
Total production, all products, 1971 - 883,890 tons								
Fine papers	177	18	195	215	20	230	23	360
Fine paper production, 1971 - 330,000 tons								
Total production, all products, 1971 - 455,000 tons								
Paperboard	98	10	108	129	21	127	13	160
Paperboard production, 1971 - 335,640 tons								
Total production, all products, 1971 - 441,540 tons								

(1) Depreciation and interest estimated at 10% of average variable costs.

even if an error of as much as 30 percent is admitted in the cost and revenue adjustments for 1974, it is clear that substantial increases in the profit per ton for all categories except paperboard have been achieved by Ontario mills.

The costs and revenue data were apportioned to each mill on the basis of production, pulp wood use and mill employment (see Table III-36 for data).⁹⁹ The cost estimates for 1971 were computed on a per ton basis and escalated by the 30 percent inflation factor. Current average revenue figures were taken from Table III-39. The estimated total costs, revenues and profit margin per ton for each mill for which Industrial Census data was provided in an aggregated form are summarized in Table III-41.

These figures are presented with several qualifications. First, the prices and average revenue figures reflect recent price rises and have been in effect for only a few months. The actual average revenue received by a mill over 1974 might well be lower or higher, whichever way prices move. Secondly, the figures are gross estimates and should be regarded only as indicators of the relative orders of magnitude of costs, revenues and profits for each mill.

The wide differences in costs and gross profits from one mill to another is indicative of the differences in size, age and technology inherent in mill. Based on this analysis only two mills, Anglo-Canadian at Dryden and Great

⁹⁹ The procedure used in apportioning the costs and the revenues to each mill is explained in Appendix H.

TABLE III-41
UPDATED COSTS, REVENUES AND PROFITS FOR SELECTED MILLS, 1974

Mill	Location	Product	Estimated Current Production (000 Tons per year)	Estimated Average Variable Costs, 1971 (\$/Ton)	Estimated Variable Costs (30% Increase over 1971)	Fixed Costs: Depreciation + interest, (% of Variable Costs)	Total Costs (\$/Ton)	Current Price or Average Value (\$/Ton)	Gross Profit Margin (Current Price - Total Costs)
<u>Bleached Kraft Market Pulp - Average for Group</u>									
Abitibi	Smooth Rock Falls	Bleached Kraft Market Pulp	120	146	189	19	208	265	57
Am. Can	Marathon	"	180	129	167	17	184	265	81
Dryden	Dryden	"	200	171	222	14	236	265	29
Eddy	Espanola	"	230	117	152	15	167	265	98
Kimberly-Clark	Terrace Bay	"	150	138	179	18	197	265	68
<u>Newsprint, Na Base Sulfite Pulp-Avg. for Group</u>									
Abitibi	Ft. William, Thunder Bay	Newsprint	132	80	104	10	114	235	121
Abitibi	Iroquois Falls	Newsprint Wrapper	335 16	99	129	13	142	235	93
Abitibi	Port Arthur, Thunder Bay	Newsprint	161	80	104	10	114	235	121

(1) Depreciation and interest costs are estimated as a percentage of variable costs. They are as follows:

Abitibi	10%	Dryden	6.5%
Domtar	7%	All others	10%
Great Lakes	12%		

Continued...

TABLE III-41 (CONTINUED)

Mill	Location	Product	Estimated Current Production (000 tons per year)	Estimated Costs \$per ton, 1974				Current Price or Average Value (\$/Ton)	Gross Profit Margin: (Current Price - Total Costs)
				Estimated Average Variable Costs, 1971 (\$/Ton)	Variable Costs (30% Increase over 1971)	Fixed Costs: Depreciation + interest, (% of variable) Costs)	Total Costs (\$/Ton)		
Ont. Paper Thorold		Newsprint	248	108	140	14	154	235	81
Newsprint, Mg Base Sulfite Pulp - Avg. for Group				98	138				
Great Lakes Thunder Bay		Newsprint	400	135	175	21	196	235	39
		Bleached Kraft Market Pulp	185						
Ont. - Minnesota									
Kenora		Newsprint	275	70	91	9	100	235	135
Spruce Falls Kapuskasing		Newsprint	400	70	91	9	100	235	135
Fine Paper - Average for Group				177	230				
Domtar	Cornwall	Fine Paper	630	162	210	15	225	360	135
Abitibi	Thorold	Fine Paper	250	199	258	26	284	360	76
Abitibi	Thunder Bay	Fine Paper	280	200	260	26	286	360	74
Paperboard - Average for Group				98	127	13	140	160	20

(1) Depreciation and interest costs are estimated as a percentage of variable costs. They are as follows:

Abitibi	10 %	Dryden	6.5 %
Domtar	7 %	All others	10.0 %
Great Lakes	12 %		

Lakes at Thunder Bay, appear to be high cost operations relative to other mills. Moreover, the position of paper-board mills appears not to have improved since 1971. The rest of the mills represented in Table III-41 seem to be making gross profits in excess of \$50.00 per ton of product.

5. Financial Condition of Firms

While profits are important, they are not the only indication a firm's financial strength. A careful review of annual reports and Dun and Bradstreet Business Information Reports show clearly that all of the pulp and paper companies with mills in Ontario are in strong financial positions despite recent periods of low profitability. This is true also for five smaller mills - Miller Brothers at Glen Miller, IKO Industries at Brampton, Strathcona Paper, Beaver Wood Fibre at Thorold and Sunoco Ltd. at Brantford. The credit ratings of all of these firms are extremely good and the Dun and Bradstreet Reports are all, without exception, highly favourable.

However, having examined annual reports and other financial sources for this information, we are no closer to determining whether firms will be willing or able to spend money for pollution abatement programs as stated at the beginning of this section. There is no objective criteria for the government to decide how much the firm can "afford" for pollution control based on the information available.

Such a determination would have to be arrived at by a detailed examination of a firm's current books, charter and by-laws. Again, even if the Ministry did determine that the firm could afford a given amount for waste treatment, it would still be faced with problems of moving the firm to action. The policies to be considered in this study are directed to this end.

Antiquated machinery and mills have been touted as being a distinct disadvantage to eastern Canadian pulp and paper mills. In one way, older facilities can be an advantage. As was pointed out in section H-4, the actual fixed costs of many of the mills may be lower than the amounts estimated in this study because the mills are likely to be fully depreciated and loans will have been paid off. With this possibility in mind, capital expenditures and depreciation for four Canadian firms are presented in Table III-42. All of these companies appear to have been investing in capital equipment sufficient to maintain growing or fairly steady annual depreciation deductions.

I. SUMMARY AND CONCLUSIONS

1. Economic Characteristics of the Industry

Three product markets are served by Ontario pulp and paper mills: sulfate market pulp, newsprint and tariff-protected paper and paperboard products. Analyses of market structure, production patterns and price behaviour indicate that the international pulp market is very competitive. Individual firms have little or no effect on prices of this

TABLE III-42

CAPITAL EXPENDITURES AND DEPRECIATION INCURRED BY PULP AND
PAPER COMPANIES OPERATING IN ONTARIO

\$000

COMPANY	1966		1967		1968		1969		1970		1971		1972	
	CE	Dep	CE	Dep	CE	Dep	CE	Dep	CE	Dep	CE	Dep	CE	Dep
Abitibi (1) Env. Expenditures	20,842	11,599	13,332	12,284	14,476	15,078	21,836	16,076	15,178	16,023	9,481 1,126	16,682	10,904 535	16,646
Dontar Env. Expenditures					12,715	25,000	25,896	25,000	38,964	26,245	23,656 2,700	26,107	28,485 4,591	26,432
Anglo-Canadian Env. Expenditures	7,040	4,914	7,616	5,148	11,288	5,137	9,342	5,284	5,484	5,661	3,934 447	5,579	2,699 65	5,528
Great Lakes Env. Expenditures	13,558	5,637	3,671	7,506	2,222	6,881	2,704	6,528	7,446	5,873	11,191 2,716	5,843	1,869	

(1) Capital Expenditures on land, plant and equipment. Dep = Depreciation CE = Capital Expenditures

SOURCE: Capital Expenditures and depreciation: Annual Reports of the respective firms.

product. Production capacity and output of market kraft pulp has been climbing steadily over the past decade while prices have moved up and down, adjusting with the shifts in demand or large increases in production capacity.

Eastern Canadian newsprint producers have a history of attempting to establish control over newsprint prices with the approval and sometimes the active support of the Ontario and Quebec governments. However, their customers, newspaper publishers, are large, few in number, well organized and have been able to counter-balance the periodic efforts of newsprint manufacturers and provincial governments to control prices. In contrast to the market pulp market, newsprint prices have risen steadily over the years without frequent or large fluctuations. Newsprint producers have apparently been partially successful in their efforts to maintain long term stable and rising prices although various short-run concessions are common during periods of slack demand. While the overall performance of the newsprint sector is judged to be workably competitive, producers do seem to be able to prevent prolonged periods of declining prices.

Writing papers, wrapping papers, tissue and paperboard products are protected by tariffs in Canada as in most major trading countries, hence production of these grades is geared particularly to the domestic market. Production capacity of writing, wrapping and tissue papers is relatively concentrated in the hands of four firms - Abitibi, Domtar, Eddy and Roland. The prices of these three product groups have been very stable over time and movements have tended to be concentrated in discrete jumps at annual intervals. These facts imply that producers of these particular products have some degree of market power; that is, they have some control over prices. Firms which produce fine papers and tissue, i.e., Abitibi, Domtar, Eddy, Kimberly-Clark, and Canadian International Paper, would, therefore, be better able to pass on added environmental costs directly to consumers than would be possible in the newsprint or market pulp markets.

While the demand for paper and paperboard products is generally price inelastic (a 1 percent increase in price of paper products will result in a reduction of the quantity demanded by less than 1 percent), demand is sensitive to income and to the level of business activity. Business recessions can affect the pulp and paper industry in several ways. The most important effect for Ontario is that, in a recession, businesses reduce advertising. Hence, the demand for newsprint is curtailed. The demand for paperboard and

wrapping paper is heavily dependent on the level of manufacturing and construction activity. Consequently, the pulp and paper industry is subject to cycles of boom followed by relatively large increments in production capacity, a softening demand, periods of deteriorating profits and closure of marginal facilities.

The industry has just come out of a relatively severe recession during 1970, 1971 and 1972. Sales, production, operating ratios and prices have risen since middle 1973 to unprecedented levels and it appears that these market conditions will continue through the next 12 to 18 months despite uncertainties about rising fuel prices and a possible general recession. Profits in 1973 of four pulp and paper companies which have mills in Ontario were 300 percent higher than 1972.¹⁰⁰

Price controls on pulp and paper products in the U.S. were lifted in April 1974 but paper makers there have been loathe to embark on any major expansion programs because of the uncertainties attendant with the energy crisis and a sluggish economy. Expansion of existing paper-making capacity is planned in that country so that Canadian pulp will be required to make up the deficits expected in U.S. pulp production.

How long the boom in pulp and paper will last

¹⁰⁰ "Business Barometer", Pulp and Paper Magazine of Canada May 1973, p. 24.

depends on how fast new capacity is constructed and on the continuing growth in demand. While most expansion programs to date have involved speeding up machines, addition of new machines or some other modification of present facilities, most companies have major expansion plans on the board. Three companies in Ontario have announced their intention of constructing new pulp capacity and more are expected.

The capacity of chemical grade market pulp is expected to grow by about six percent per year through 1977.¹⁰¹ However, these increases are not expected to have a depressing effect on prices for two reasons. First, the increases in capacity are not in excess of the expected growth in demand here in Canada and the United States. Secondly, the marginal costs of producing pulp will rise as a result of the growing scarcity of accessible wood, costs of pollution control and rising wage rates.

2. Competitive Costs

It is unlikely that Ontario mills will suffer a long term competitive disadvantage with respect to other producing countries, particularly the United States, Scandinavia, British Columbia and Quebec. The water and air pollution abatement programs being enacted in each of

¹⁰¹ "Most New Canadian Capacity from Existing Mills and Equipment", Paper Trade Journal, July 15, 1974, p. 26.

these areas will involve long run costs at least as great as those contemplated for Ontario.

With regard to the short-run disparity between the environmental requirements of older mills and enforcement policies of Quebec and Ontario, it is concluded that the industry in Ontario will not suffer a significant, long-term cost disadvantage for several reasons. First, wood limits are becoming scarce in Quebec as in Ontario so that production is not easily transferrable from one province to another. Secondly, the markets and customers served by Quebec and Ontario are separable. There is little likelihood of Quebec paper mills invading Ontario markets to a substantial degree. Third, expected growth in demand in the respective markets will further limit the possibility of Ontario mills losing customers as a result of pollution control costs. Finally, Quebec mills will inevitably be required to incur equivalent (or higher) pollution abatement costs as a consequence of federal regulations, if not provincial enforcement. In summary, the significance of wood cost and availability, market location and demand growth far exceeds the relative differences in costs which will result from the enforcement of pollution control on Ontario mills.

3. Profitability

An analysis of mill profitability indicates that even during a so-called bad year, 1971, the gross profit

margins for most mills were on the order of \$8.00 to \$30.00 per ton. The estimated profit margins have since increased substantially for all mills except paperboard plants. The profit margins at which the mills are currently operating are, in most cases, sufficient to absorb additional costs of pollution abatement. Moreover, under the current market conditions, it is likely that such cost increases can be easily passed on by firms in higher prices.

4. Potential for Closure

It is not possible, given the information available for this study, to determine precisely which firms will reduce output, lay off workers or even whether a particular mill will close under specific environmental policy alternatives. It is very unlikely, however, that mill closures due to the enforcement of environmental policies will be permitted. An implicit constraint on the enforcement of pollution abatement in Ontario to date appears to have been the avoidance of plant closures and loss of employment especially where pulp and paper mills are the sole source of employment and income to entire communities. Avoidance of plant closure will be an explicit constraint in the evaluation of alternative environmental policies presented in Chapter VI.

However, business cycles have no social conscience and mill closures are possible if the industry undergoes another prolonged period of business recession or excess

capacity and falling prices. It is useful, therefore, to determine which mills are likely to become unprofitable in another business recession. The following criteria are used to identify these mills.

(1) Mill size:

The smaller the mill, the higher average costs are likely to be. Mills smaller than the average for Ontario are assumed to be high cost mills.

(2) Product of mill:

Market kraft and newsprint prices are more likely to fall during business recessions than are those of paper and paperboard products.

(3) Product diversification:

Mills which make more than one product are less vulnerable to business cycles than single product mills.

(4) Vertical integration:

Mills which have assured wood supplies, which make both pulp and paper and which have assured markets for products through associated publishers or wholesale and retail marketing outlets are much better off than mills which must buy their pulp or which must sell their output on the open market.

(5) Age of pulping facility and mill:

While paper making machines can be renovated, updated or replaced with relative ease, pulping process

changes or the redesign of process flows to gain efficiency or decrease pollution would normally necessitate reconstruction of the entire mill. Hence, older pulping facilities are likely to be more expensive to operate than new ones.

(6) Pulping process:

Sulfite pulping operations require extensive and costly modifications in order to reduce BOD discharge. Mills with a calcium base sulfite process are especially disadvantaged because significant pollution abatement requires conversion to a different pulping process. Closure of the sulfite pulping equipment is often the most economical way of meeting environmental standards.

(7) Size of parent company:

A multi-plant company would have more resources available to keep a mill open than would a single-plant firm.

(8) Capital improvements:

A firm is not likely to abandon a mill on which it has invested considerable sums of money on improvements over the past few years.

Based on these criteria, mills which might possibly be closed during a business recession are listed in Table III-43

TABLE III-43

MILLS CONSIDERED TO HAVE A HIGH POTENTIAL FOR CLOSURE UNDER DEPRESSED MARKET CONDITIONS

COMPANY	MILL LOCATION	PRODUCTS	CAPACITY (TONS/DAY)	VERTICAL INTEGRATION	SINGLE -MILL FIRM	AGE OF CURRENT FACILITY (years)
Abitibi	Smooth Rock Falls	Bleached kraft market pulp	340	Yes	No	9
Abitibi	Sault Ste. Marie	Newsprint	345	Yes	No	70+
Domtar	St. Catharines	Fine paper & board	87	Yes	No	70+
Domtar	Thorold	Paper board	65	Yes	No	50+
Georgia Pacific	Beaver Wood Fibre, Thorold	Newsprint paper board	120 190	No	No	40+ 3
Strathcona	Strathcona	Paper board	100	No	Yes	70+
Miller Bros.	Glen Miller	Paper board	90	No	Yes	
IKO Industries	Brampton	Paper board	50	No	No	
Sunoco	Brantford	Paper board	20	No	No	
American Can	Marathon	Bleached kraft market pulp	485	No	No	28

This analysis of markets and the economic characteristics of the pulp and paper industry is by no complete or exhaustive. It is intended to serve as a survey of the current status of the markets and to identify the important structural elements of the industry. An economic model of the Canadian pulp and paper industry is currently being developed by Andrew Muller of McMaster University. That study will treat in depth a number of issues which have been dealt with rather superficially in the present report.

CHAPTER IV

ENVIRONMENTAL IMPACTS

ENVIRONMENTAL IMPACTS

A. INTRODUCTION

Individuals and groups derive benefits from the use and enjoyment of water, air and land resources. Pollution costs arise when waste effluents of one group (a factory or municipality) interfere with or otherwise impair the use or enjoyment of environmental resources by another group (e.g. boaters or riparian landowners). These costs include losses due to sickness and disease, opportunity costs of foregoing an activity or of shifting to a more expensive alternative activity, and costs of preventing discomfort and damages. Another concept of environmental benefits involves features which are not necessarily used directly by many people but which are, for some reason, valued by society. Certain environmental resources or unique natural features are protected so that present and future generations have the option of using or enjoying them. Wilderness lakes or rivers, unique geological formations and plant or animal species may be the objects of this "option demand".

Since a certain amount of waste material can be deposited in the air, land or water without interfering with other uses, waste discharges per se are not necessarily a problem.

Liquid and airborne wastes discharged by pulp and paper mills constitute a problem only when they interfere with other uses of the receiving water, air or land. Thus, pollution damages or conflicts are not apparent until the amounts of waste discharges are in excess of the assimilative capacity of the receiving water or air. The additional costs of achieving complete treatment of wastes or "zero discharge" are likely, therefore, to greatly exceed the benefits gained. If the costs of a given level of pollution abatement greatly exceed the added benefits, then that level of pollution abatement would be inefficient and a waste of resources from the point of view of society as well as private waste dischargers. Using efficiency as a decision criterion the optimal degree of pollution abatement is defined as the level at which the extra costs of abatement are equal to the additional benefits (or costs avoided) resulting from the abatement. Estimation of the actual benefits of pollution abatement is, however, a formidable problem.

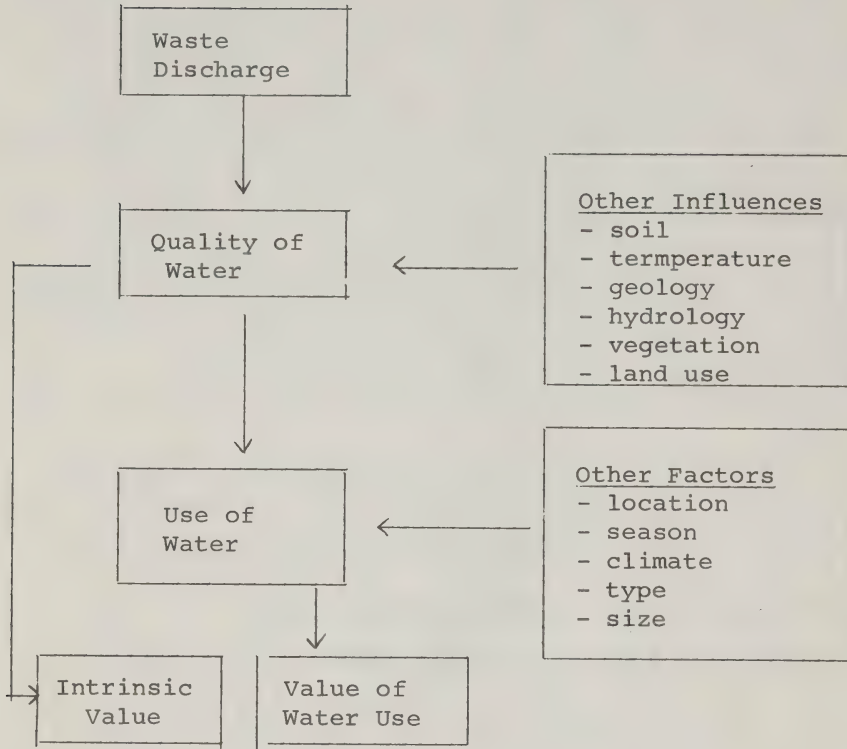
The following rather simplistic sequential framework is proposed as an explanation of the linkage between waste discharges and the benefits of pollution abatement. For purposes of exposition, the discussion will refer to water pollution, although the model could be applied to air pollution problems as well.

The value of a river, lake or pond is derived from the present and potential uses which can be made of the water body. Unique features of the water body or river may also be considered to have some intrinsic value. Water quality has an important influence on the use and enjoyment associated with a particular body of water along with such factors as season, location and the type of water. Water quality is, in turn, strongly influenced by the volumes and quality of wastes discharged. This model is illustrated in Figure IV-1.

Relatively more is known about the technical relationships linking waste discharges and water quality than about how incremental changes in water quality effect water uses. In some instances, the relationship between water quality and water uses can be quantified. For example, the costs of water treatment are dependent on the quality of the raw water supply. Water treatment costs saved by improving the ambient quality of the water source define the benefits of pollution abatement. For recreational uses, the relationships between specific levels of water quality parameters and changes in the intensity of water uses are still in need of study. An on-site assessment of the effects of water and air waste discharges at each

FIGURE IV - 1

LINKING THE VALUE OF NATURAL WATER SYSTEMS
TO WASTE DISCHARGES



mill in Ontario would be a desirable appendix to the present study. On-site visits and environmental analyses at all mills were, however, beyond the scope and resources available for this study.

In the sections to follow, the location and amounts of liquid wastes discharged from each of pulp and paper mill in Ontario are identified. The pollution problems resulting from these discharges are summarized along with the expected effects of two alternative levels of pollution abatement and total closure of the mills. The relative significance of the uses of certain water bodies are discussed in a qualitative manner. The expected benefits of pollution abatement at each mill in the province are then specified and organized in a systematic manner.

B. WASTEWATER DISCHARGES

Those water bodies and rivers which receive the liquid wastes of each pulp and paper mill in Ontario are listed in Table IV-1. Included in this Table are the volumes of waste flow for each mill as well as the estimated, average

biological oxygen demand (BOD_5) suspended solids (SS) and dissolved solids (DS) loadings which were discharged during 1971 and 1973. Other important waste discharges to each water system are also listed.

During the two years over which the surveys were taken, BOD_5 and suspended solids have apparently been reduced in 18 mills and the average rate of discharge of water was reduced in 9 mills. BOD_5 loadings were increased in 8 mills during the same period while 5 mills increased their average discharge of suspended solids. Five mills increased their discharge of total dissolved solids while such loadings were decreased in five other mills.

BOD_5 and suspended solids are responsible for most of the gross pollution effects in rivers or lakes: dissolved oxygen (DO) sags, odour, sludge deposits, foaming and aesthetic damages. These two types of wastes can also be removed by well-known sedimentation and biological treatment processes with relative ease. Dissolved solids include sulfates, phosphates, chlorides, nitrates, heavy metals and organic compounds. These materials are generally responsible for tastes, colour and toxicity. It is clear from Table IV-1 that the amounts of total dissolved solids being discharged by pulp and paper mills vastly exceed BOD_5 and suspended

solids. However, the effects of dissolved solids on those water systems listed in the Table IV-1 are not as well understood at this time as are the effects of BOD₅ and suspended solids. Moreover, removal of dissolved solids from pulp and paper mill effluents generally involves more sophisticated and expensive treatment processes than does suspended solids and BOD₅ removal. However, once BOD₅ and suspended solids are removed from mill wastes to an acceptable degree, dissolved solids may then become the important pollution problem for certain lakes and rivers.

In this report, discussions of abatement policies will concentrate on BOD₅ and suspended solids for three reasons. These two parameters can be measured with relative ease; they cause the gross pollution effects attributed to pulp and paper mills, and they are most amenable to removal by traditional treatment processes.

Several types of receiving waters can be identified from Table IV-1. First, eighteen mills discharge wastes into boundary waters which receive, in addition to the wastes from Ontario pulp and paper mills, discharges from industrial and municipal sources which are outside Ontario's jurisdiction. These water bodies and the Ontario pulp and paper mills which discharge waste waters into them are listed below in Table VI-2.

TABLE IV - 1

WATER BODIES RECEIVING PULP AND PAPER WASTES*

Receiving Water	Flow CFS	Pulp and Paper Company			Other Important Discharges		
		Name	Effluent MGD	Waste Parameter	T/Day	Effluent MGD	Waste Parameter
Lake Superior Thunder Bay Harbour		Abitibi Forest Prod. Thunder Bay	'71	'73	'71	'73	T/Day Parameter 1971
			20.1	18.4	48.9	31.2	Northern Wood
					7.6	7.2	Preservers
					--	107.0	
		Abitibi Paper Co., Fort William	7.0	6.7	26.0	23.5	Canada Malting
					2.0	1.8	
					--	63.1	
							BOD SS
		Abitibi, Port Arthur	11.4	11.5	27.0	29.6	2.3
					2.0	3.7	.4
					--	82.8	
							BOD SS
Kaministiquia R. to Lake Superior		Great Lakes Paper Co., Thunder Bay	54.9	35.7	153.3	99.4	Industrial Grain
					62.4	14.3	Producers
					--	502.0	
							Dow Chemical
Nipigon Bay		Domtar, Red Rock	22.8	23.9			4.2
							C.P. Rail
					22.7	16.3	Town of Red Rock
					18.9	5.6	Town of Nipigon
Peninsula Harbour and Lake Superior		American Can, Marathon (Kraft Mill)	22.9	20.9	17.3	20.5	Marathon Sewage
					10.7	6.4	Treatment Plant
					--	103.0	American Can,
							(Chlor-Alkali)
							BOD
							Hg
							(0.27 lbs./day)

TABLE IV-1 (CONTINUED)

WATER BODIES RECEIVING PULP AND PAPER WASTES

Other Important Discharges

Receiving Water	Flow CFS	Pulp and Paper Company		Waste Parameter	T/Day		Name	Effluent MGD	Waste Parameter	T/Day 1971
		Name	Effluent MGD		'71	'73				
Moberly Bay		Kimberly-Clark, Terrace Bay	19.8	BOD SS DS	24.6	8.0 4.3 161.0				
Lake Ontario, Old Welland Canal to Twelve Mile Creek to Martindale Pond to Lake Ontario.	70 from industry + 50 from Welland Ship Canal Twelve Mile Creek controlled by dam at Decew Falls.	Ontario Paper Co. Domtar Const., Materials, Thorold	22.1	BOD SS DS	27.4	86.0 14.0 278.0				
Abitibi, Thorold			5.0	BOD SS DS	5.7	1.5 1.5 29.0				
Domtar Fine Papers, St. Catharines			2.1	BOD SS DS	2.1	.7 .9 4.1				
Kimberly-Clark, St. Catharines			3.3	BOD SS DS	2.0	1.1 3.0 .5				
Beaver Dams Creek to Lake Gibson to Twelve Mile Creek.		Beaverwood Fire, Thorold	3.5	BOD SS	4.5	5.0 6.0				

Heavily populated area with numerous industrial and municipal waste discharges at different points throughout system.

TABLE IV - 1 (CONTINUED)

WATER BODIES RECEIVING PULP AND PAPER WASTES

Receiving Water	Flow CFS	Pulp and Paper Company			Other Important Discharges		
		Name	Effluent MGD	Waste Parameter	Name	Effluent MGD	T/Day Parameter 1971
			'71 '73	'71 '73			
Wabigoon River	1250-1938	Dryden (Anglo-Canadian)	31.0 31.0	BOD SS DS	Dryden Chem. Ltd.	1.0	Hg (.03lbs/day)
Abitibi River	0-6000	Abitibi, Iroquois Falls	21.7 22.3	BOD SS DS	Sewage from Iroquois Falls. Montrock - No other industrial Wastes.		
Sturgeon River L. Nipissing	21-31	Abitibi, Sturgeon Falls	5.0 4.4	BOD SS DS	Sewage from Sturgeon Falls		
Lower Spanish River	1200-4500	Eddy Forest Products, Espanola	20.0 30.3	BOD SS DS	Sewage Treatment from Espanola Canadian Indust. Ltd. (Mine) Canadian Indust. Ltd. (Mine)	.35 .018	
Ottawa River		Eddy Paper, Ottawa	3.5 3.9	BOD SS	A detailed study of the Ottawa River has been published listing all sources of pollution. There are about 35 industrial dischargers on the Ontario side.		
Kapuskasing R.	310-18300	Canadian International Paper, Hawkesbury	24.0 24.0	BOD SS			
		Spruce Falls P & P Co. Kimberly-Clark, Kapuskasing	43.0 28.4	BOD SS DS			
		Kimberly-Clark, Kapuskasing	3.6	BOD SS	Sewage from Kapuskasing		

Continued

TABLE IV-1 (CONTINUED)

WATER BODIES RECEIVING PULP AND PAPER WASTES									
Pulp and Paper Company				Other Important Discharges					
Receiving Water	Flow CFS	Name	Effluent MGD	Waste Parameter	T/Day '71 '73	Name	Effluent MGD	Waste Parameter	T/Day 1971
Mattagami R.		Abitibi, Smooth Rock Falls	7.0	8.6	BOD SS DS	14.0 15.0 76.5	6.8 9.6 35.0	Smooth Rock Falls	Sewage
Rainy River		Ontario-Minnesota, Fort Frances	17	18	BOD SS DS	15.0 6.8 --	17.0 11.0 110.0	Pulp and paper mill on U.S. side of river.	
Winnipeg River		Ontario-Minnesota, Kenora	12	10.5	BOD SS DS	50.0 7.0 80.0	42.0 4.0 105.0	Kenora Sewage Treatment Plant	Sewage
East River	130-1680	Kimberly-Clark, Huntsville							
Trent River		Domtar Packaging Ltd., Trenton	.4	.08	BOD SS DS	10.0 1.1 29.0	4.0 .6 13.0	Breithaupt Leather Co., Campbellford	
		Miller Bros., Glen Miller	2.8	1.6	BOD SS	1.9 2.8	1.2 2.9	Breithaupt Leather, Hastings	
St. Lawrence R.		Domtar, Cornwall	50	33	BOD SS Phenols	70.0 65.0 .2	22.5 12.0 --	There are about 14 other industrial dischargers in the St. Lawrence under Ontario jurisdiction, including C.I.L.	Hg (.5 lbs/day)
St. Mary's R.		Abitibi, Sault Ste. Marie	17.0	15.0	BOD SS DS	33.0 25.0 -	6.4 14.6 10.0	Steel mills Sewage from Sault Ste. Marie in U.S. and Canada	

Continued

TABLE IV-1 (CONTINUED)

WATER BODIES RECEIVING PULP AND PAPER WASTES									
Receiving Water	Flow CFS	Pulp and Paper Company			Other Important Discharges				
		Name	Effluent MGD		Name	Effluent MGD	Waste Parameter	T/Day 1971	
Duschenay Creek, Lake Nipissing		Canadian Johns Manville North Bay	.2	.2		BOD	.09	-	
						SS	.09	.05	
						DS	1.0	.3	
Napanee R.		Strathcona Paper, Strathcona	.8	.8		BOD	.1	.7	
						SS	.3	.03	
Toronto Sewage System		Anglo-Canadian Pulp and Paper							
		Atlantic Packaging							
		Canadian International Paper							
		Continental Can (2 mills)							
		Dontar Fine Papers							

SOURCE: Ontario Ministry of the Environment, Status of Industrial Pollution Control in Ontario (bi-annual). Toronto: Ontario Ministry of the Environment, Appendices, Industrial Waste Discharges on Drainage Basin Basis, 1971 and 1973.

*The data in the table are incomplete, and the Ministry has not checked all the data for accuracy. Annual averages do not reflect the wide variations in flow and loadings that may occur in shorter time periods.

- 278 -
TABLE IV-2

WATER SYSTEMS RECEIVING MILL WASTE WATERS WHICH ARE UNDER JOINT JURISDICTIONS

WATER BODY	OTHER JURISDICTIONS INVOLVED	MILLS IN ONTARIO	
Lake Superior	Canada Federal Gov't	Abitibi	3 mills
	U.S. Federal Gov't	Great Lakes	1 mill
	Michigan	Domtar	1 mill
	Minnesota	American Can	1 mill
		Kimberly-Clark	1 mill
Ottawa River	Quebec	Eddy Paper Co.	1 mill
	Canada Federal Gov't	Canadian Int. Paper	1 mill
St. Lawrence River	Canada Federal Gov't	Domtar	1 mill
	Quebec		
	U.S. Federal Gov't		
	New York		
St. Mary's River	U.S. Federal Gov't	Abitibi	1 mill
	Canada Federal Gov't		
	Michigan		
Rainy River	Canada Federal Gov't	Ontario-Minnesota	1 mill
	U.S. Federal Gov't		
	Minnesota		
Lake Ontario	Canada Federal Gov't	Ontario Paper	1 mill
(12 Mile Creek)	U.S. Federal Gov't	Abitibi	1 mill
(Old Welland Canal)	New York	Domtar	2 mills
		Beaverwood Fibre	1 mill
		Kimberly-Clark	1 mill

Of the 24 industrial establishments and the 38 municipalities discharging wastes into the Ottawa River, only six manufacturing plants, including two of the total eight pulp and paper mills on the River, and eighteen of the municipalities, are in Ontario. The rest are in Quebec. In order to achieve an improvement in the quality of the Ottawa River, abatement must proceed on both sides of the river and in both the industrial and municipal sectors of each province. A co-ordinated river basin management plan for the Ottawa River has been proposed but the Provinces of Ontario and Quebec have not as yet fully adopted the recommendations. Similar programmes would be required to achieve measurable water quality improvement on the St. Lawrence, St. Mary's and Rainy Rivers.

The observable water quality problems and conflicts arising out of discharges into Lake Superior tend to be relatively localized although long term effects may be more wide-spread. Identifying the actual detrimental effects of the waste discharges into so vast a body of water as Lake Superior is a problem currently under study.

A second type of receiving water body includes those rivers or lakes within Ontario's jurisdiction and which have wastewater entering from sources in addition to pulp

and paper mills. The Old Welland Canal - Lake Gibson - Twelve Mile Creek - Martindale Pond system carries wastes from six pulp and paper mills as well as other industrial sources in the Thorold-St. Catharines area. The Trent River is another example with two pulp and paper mills, two tanneries and numerous towns and villages. Lake Nipissing receives wastes from two paper mills and several towns located around the lake, including North Bay.

A third classification includes those rivers or lakes in which pulp and paper mills are virtually the only sources of pollution. This includes the Wabigoon, the Abitibi, the Mattagami, the Spanish, the Kapuskasing and the Sturgeon Rivers.

C. EFFECTS OF PAPER MILL EFFLUENTS ON WATER QUALITY

A description of the water pollution problems which each mill is causing is summarized in Table IV-3. The changes in water quality which would occur at each mill as a result of three alternative effluent conditions are also summarized in this Table. Table IV-3 is based on detailed comments about each mill which are presented in Appendix E. Alternative effluent conditions or treatment levels considered are:

- (A) meeting Ministry of Environment effluent quality objectives as currently specified for each mill,
- (B) implementing additional treatment beyond current effluent MOE objectives for each mill,

SUMMARY OF ENVIRONMENTAL EFFECTS OF THREE ALTERNATIVE EFFLUENT CONDITIONS

<u>Mill</u>	<u>Location</u>	<u>Receiving Water</u>	<u>Current Problems</u>	<u>Does Mill Currently Meet MOE</u>		<u>Effects if Mill Meets MOE Water Quality Objectives</u>	<u>Effects if Mill Implements Extra Treatment Beyond MOE Requirements</u>
				<u>Yes</u>	<u>No</u>		
American Can	Marathon	Peninsula Harbour, Lake Superior	Colour, foaming, bacteria, accumulation of fibre, bark and sludge, Hg from chlor-alkali plant.		X	Little effect on water quality. Zone of mixing hard to distinguish. Residual Hg in fish.	Eliminate problems immediately. Residual Hg in fish.
Strathcona Paper Co.	Strathcona	Napamee River	Minor DO sag, sludge, discharge very small.	X		"BOD problem would still persist".	Will eliminate BOD.
Ontario-Minnesota Pulp and Paper	Kenora	Winnipeg River	Accumulation of fibre, colour. Effects very slight.	X		Will eliminate aesthetic effect of effluent; recreational uses restored.	No additional improvements necessary.
Ontario-Minnesota Pulp and Paper	Fort Frances	Rainy River	DO, sludge, accumulation of fibre and bark. Tainted fish, high bacteria counts.	X		Water quality would be satisfactory if mill on U.S. side also met IJC effluent suggestions.	No additional improvements necessary if both mill met IJC effluent objectives.
Miller Brothers	Glen Miller	Trent River	Turbidity, colour, foaming.	X		Will eliminate problem.	No additional improvements necessary.
E.B. Eddy	Ottawa	Ottawa River	Mercury accumulation & fish tainting from other mills, accumulation of bark & fibre.	X		Effluent of mill too small to have any effect on quality of river.	No improvement possible.
Dryden	Dryden	Wabigoon River	Large sludge deposits, fish tainting, foaming, river crosses highway, Hg from chlor-alkali plant.	X		No improvement because river flow too small relative to mill discharge. Residual Hg in fish.	Flow diversion or dredging deposits would give "marginal improvement". Residual Hg in fish.
Dontar	Cornwall	St. Lawrence	Fish tainting but not specifically traced to this mill.	X		Tainting might be eliminated.	No expected improvements. Extra treatment might be required to overcome tainting.
Dontar Packaging Limited	Trenton	Trent	No discernible problems.	X		Adequate.	

Effects if Mill
Closes Permanently

Eliminate problems
immediately. Residual
Hg in fish.

Eliminate problem
immediately.

Eliminate aesthetic
problem associated
with effluent; some
sludge deposits would
persist for several
years.

Both mills would
have to close in
order to have an
effect on water
quality.

Eliminate problem
immediately.

Effluent too small
to have any effect
on quality of river.

Massive sludge deposits
would continue to
exert BOD and affect
bottom flora and fauna
for many years. Residual
Hg in fish.
Might eliminate tainting.
St. Lawrence too large
for other noticeable
effects.

Mill	Location	Receiving Water	Current Problems	Does Mill Currently Meet MOE Water Quality Requirements		Effects if Mill Meets MOE Water Quality Objectives	Effects if Mill Implements Extra Treatment Beyond MOE Requirement	Effects if Mill Closes Permanently
				Yes	No			
Abitibi Forest Products Dontar Fine Papers Kimberly-Clark Ontario Paper Co. Dontar Construction Materials Limited	Thorold	Old Welland Canal to 12-Mile Creek to Martindale Pond to Lake Ontario.	Canal is all mill effluent plus discharges from Ship Canal - colour, foaming, anoxic conditions. Martindale Pond - bark & fibre accumulations, BOD-DO sag. Lake Ontario - effects unknown.	X	X	Small reduction in BOD. Fibre sludge in Martindale Pond not affected.	Would remove aesthetic problems: foaming and colour.	Old Welland Canal would dry up - no water through canal in park area. 12-Mile Creek and Martindale Pond would take several years for water quality to be restored.
	Thorold	Catharines		X				
	Thorold			X				
	Thorold			X				
	Thorold			X				
Beaver Wood Fibre	Thorold	Lake Gibson to Martindale Pond to Lake Ontario.	Sludge accumulations with high BOD in Lake Gibson.	X		Sludge accumulations stopped. Long term	Not necessary.	Sludge accumulations would stop. BOD from accumulation would persist.
Abitibi Paper Company	Smooth Rock Falls	Mattagami River	DO sag 30 miles d.s., accumulation of bark & fibre, possible tainting of fish.	X		No change in DO. Sludge accumulations retarded	Eliminate BOD. Eliminate fishing tainting.	All water quality problems rapidly eliminated.
Abitibi Paper Company	Sault Ste. Marie	St. Mary's River	Mill makes a small contribution to water quality problems in river.	X		"...adequate to protect the water quality conditions in the river."	No additional treatment required	Mill effluent small in relation to river flow. Little change in water quality.
Abitibi Paper Company	Iroquois Falls	Abitibi River	DO sag 25 miles, accumulation 40 miles, change aquatic life.	X		Immediate improvement; "...suitable for restoring all water use potentials of the river."	No additional treatment required.	Sludge deposits redeposited at Hydro dam 60 miles down stream. Minimal effect on water quality.
Abitibi Forest Products	Sturgeon Falls	Sturgeon River & Lake Nipissing	No surveys.	X		High BOD of effluent would persist.	Ammonia stripping would achieve water quality satisfactory for all uses	High quality upstream water would persist throughout reach.
Great Lakes Paper Co.	Thunder Bay	Kaministiquia River, Thunder Bay, Lake Superior	Kam. R. - Anoxic conditions for 6 miles from mill to Thunder Bay, sludge accumulations. Thunder Bay - DO sag, colour and suspended solids extend into Bay.	X		Would restore DO in Kam. to levels that would support aquatic life. Conditions in Thunder Bay will be improved.	Improve colour and aesthetic conditions in both river and lake.	"...an immediate improvement." Would restore DO in Kam. R. Eliminate colour and suspended solids, stop sludge accumulations in Kam R.

(Sludge would persist in Kaministiquia River under each alternative.)

(Sludge would persist in Kaministiquia River under each alternative.)

<u>Mill</u>	<u>Location</u>	<u>Receiving Water</u>	<u>Current Problems</u>	<u>Does Mill Currently Meet MOE Water Quality Requirements</u>		<u>Effects if Mill Meets MOE Water Quality Objectives</u>	<u>Effects if Mill Implements Extra Treatment Beyond MOE Requirements</u>	<u>Effects if Mill Closes Permanently</u>
				<u>Yes</u>	<u>No</u>			
Dontar Packaging Limited	Red Rock	Nipigon Bay, Lake Superior	Fish tainting affects commercial fishing, colour, foam.		X	Aesthetic conditions improved. Will not ensure a solution to the problem of tainting fish flesh.	"...overcome its fish tainting problem..."	Eliminate potential for fish tainting. Uncertain whether tainted fish will be eliminated.
Canadian Johns-Manville Co. Ltd.	North Bay	Duschenay Creek to Lake Nipissing	No discernible problem.	X		No problem.	No problem	No problem.
Kimberly-Clark	Terrace Bay	Blackbird Creek to Lake Superior	Creek is entirely pulp mill effluents. Bay-foam, colour, bacteria, aquatic fauna affected.	X		No change in Blackbird Creek. Satisfactory water quality conditions in Moberly Bay.	No measurable improvement in Blackbird Creek.	Blackbird Creek would dry up. Problem in Moberly Bay rapidly eliminated.
Kimberly-Clark	Huntsville	East River	No problems.	X		No problem.	No problem.	No problem.
Spruce Falls Power & Paper Kimberly-Clark	Kapuskasing	Kapuskasing River	Serious DO sag, 60 miles of sludge, fibre & bark deposits.	X		Satisfactory water quality conditions if both mills implement programs.	No additional treatment required.	If both mills closed at the same time, water quality would be restored.
Eddy Forest Products	Espanola	Spanish River	DO sag 32 miles to Lake Huron. Fibre accumulation, odour, fish tainting in river & Lake Huron, mercury, commercial fishing affected.	X		"...water quality conditions compatible with normal uses..." Would not eliminate tainting.	Eliminate tainting.	Immediate, marked improvement in water quality.
Canadian International Paper	Hawkesbury	Ottawa River	This mill is at mile 66, closest to river mouth. It has not yet been identified as contributor to mercury, fish tainting or DO sag.	X		"...measurable improvement in water quality conditions in the river."	No additional improvement if abatement in this mill alone.	"...definitely a measurable improvement... particularly the DO parameter."

Mill	Location	Receiving Water	Current Problems	Does Mill Currently Meet MOE Water Quality Requirements		Effects if Mill Meets MOE Water Quality Objectives	Effects if Mill Implements Extra Treatment Beyond MOE Requirements	Effects if Mill Closes Permanently
				Yes	No			
Abitibi Paper Co. Fort William	Thunder Bay	At mouth of Mission River, Thunder Bay	Possible contamination of water supply of Indian reserve at Chipewawa Park. Accumulation of bark and fibre on south-eastern shore of Thunder Bay.		X	"Difficult to identify an improvement in water quality conditions..."	Not able to determine at this time whether additional treatment is needed.	Eliminate local problems, no change in water quality conditions along southern eastern shoreline.
Abitibi Forest Products, Provincial Paper Division	Thunder Bay Bare Point	Thunder Bay	Accumulation of sludge on north-eastern shore Thunder Bay, local DO sag, increased Phytoplankton.		X	Slight improvement in DO.	No apparent improvement.	Slight improvement in DO, accumulations still have BOD.
Abitibi Forest Products Limited, Bare Point	Thunder Bay North of Bare Point	Thunder Bay	Possible contamination of water supply at Bare Point intake for City of Thunder Bay.		X	"No detectable or measurable improvement in chemical conditions in Thunder Bay".	No apparent improvement.	Possibly will stop fibre and bark accumulations, no change in aquatic chemistry or biology.

NOTE: While paper companies contribute a significant proportion of BOD and solid accumulations to Thunder Bay, a significant amount of discharge originates from other sources:

Wood preserves
Malting Co.
Sewage Treatment Plants
Dow Chemical (mercury)
Railroads (oil)

Abatement programs would have to be co-ordinated to make a meaningful impact on water quality.

- (6) Strathcona Paper Co. - Napanee River
- (7) Miller Bros. - Trent River
- (8) Great Lakes - Kaministiquia River
- (9) Abitibi Paper Co. - Mattagami River

In some locations, water quality conditions would be improved considerably only if Ministry effluent objectives were met by each of several mills discharging into a single receiving water system. Included are the six mills in the Thorold-St. Catharines area (Niagara Region), the three Abitibi mills and Great Lakes Paper in Thunder Bay and the Ontario-Minnesota mills on both sides of the Rainy River. Under these circumstances, clean-up in just one of the mills would not resolve water quality problems in the receiving waters. Abatement must be achieved in most, if not all of the mills in each group. Similarly, significant waste loading reduction throughout the Ottawa River would be required before the effects of pollution abatement in the CIP mill at Hawkesbury or the E. B. Eddy mill at Ottawa could be measured.

Additional treatment above and beyond that currently specified by the Ministry would be needed to eliminate fish tainting and colour in at least four mills:

- (1) Eddy Forest Products - Spanish River
- (2) Domtar Packaging Ltd. - Nipigon Bay, Lake Superior
- (3) Abitibi Paper Ltd. - Mattagami River
- (4) American Can - Terrace Bay, Lake Superior

Accumulations of sludge and fibre are so extensive in the Wabigoon River that even closure of the Anglo-Canadian mill at Dryden would not result in a short-term restoration of satisfactory water quality. However, meeting the BOD₅ and suspended solids effluent objectives of the Ministry at that mill might reduce the fish tainting that has also been a problem in the Wabigoon - English River system.

D. USES OF WATERCOURSES AFFECTED BY PULP AND PAPER MILLS

The benefits of pollution abatement depend in large part on the present and potential uses which can be made of receiving waters. Identification and quantification of the water uses on each river and lake receiving pulp and paper mill waste effluents would be an important first step in determining the benefits of pollution control for each pulp and paper mill. While the resources available for this study did not permit an on-site study of water uses at each affected location, data concerning the uses of each river and lake receiving pulp and paper mill wastes were collected from the

published literature and are presented in Appendix F. Information concerning potential uses of each water system were provided by the Water Resources Branch of the Ministry of the Environment.

A summary of the present and potential uses of some selected rivers is presented below. If the Ministry waste effluent objectives were achieved by the mills located on these rivers, then water quality would be improved to a measurable degree and the indicated uses would be restored.

(1) Kapuskasing River

There is presently virtually no recreational use made of this river due to pollution and navigation by small craft is hazardous. Large concentrations of water fowl live on the river below the mill. There is some sports fishing above the mill. There seem to be few other uses downstream.

(2) Abitibi River

This river is not used extensively for recreation due to pollution in areas directly downstream. Water supply from Iroquois Falls is taken upstream of the mill effluent outfall. Good potential for fishing and camping.

(3) Winnipeg River

While there are extensive cottage and recreational uses of Rat Portage Bay on the Lake of the Woods, there

is very little recreational activity on the River below the mill. The Dalles Indian Reserve is located 4 miles below the mill outlet.

(4) Napanee River

River serves as a water supply to Town of Napanee downstream from Strathcona Paper Co., River also receives sanitary sewage from Town of Napanee. Recreation activities are carried on upstream from Strathcona. River is navigable downstream from Napanee.

(5) Trent River

Extensive recreational and navigational use made of this river which is part of the Trent Waterway System. Serves as water supply for many communities and as a sewage disposal system.

(6) Kaministiquia River

River presently used only for waste disposal and navigation. Little or no recreational use is made of river although there is an excellent potential for swimming and boating in the river. The River is not used for recreation primarily because of pollution from mill. No sport and commercial fishing is possible. Clean-up of this river offers a substantial return in terms of the uses which will be made of the river because of the proximity of Town of Thunder Bay.

(7) Mattagami River

Rapids and falls limit access to river. Indian and some recreational fishing in river. Access roads would allow location of fishing camps along river. Hydro dams located at Smooth Rock Falls.

One river, the Spanish, was the subject of a classic court case referred to in chapter I, section F-3 of this report. This is one of the few cases in which the uses of a river which were damaged by pollution are well documented. It would be worthwhile, therefore, to consider the situation on this river in more detail. Riparian landowners used the water of the river for drinking, cooking, washing and stock watering. After the mill began operation in June, 1946, the water could no longer be used for these purposes, even if it were boiled. Smells from the river interfered with the "comfort and the enjoyment" of riparian landowners - swimming was precluded. Ice from the river became unfit for use and farm animals would no longer drink the river water. About six commercial fishermen were wiped out when the muskelunge, pickerel, and bass either died or were driven from the lower part of the river. Other commercial fishermen on Lake Huron were affected because the mill wastes tainted fish in the north channel. Three tourist and fishing camps were closed due to the pollution.

About \$5,600 in damages were awarded to the complaining landowners by Chief Justice McRuer who also issued an injunction to close the mill. After failing to get the injunction lifted by higher court appeals, the company appealed to the government. In 1950, the KVP Co. Ltd. Act was passed which dissolved all present and future injunctions against that mill. Although the Act permitted riparian landowners to continue to apply for damages against the company, it expropriated the right of those individuals to "have their land washed by water in its natural state".¹ The significance of this case and the KVP Act in law has been discussed in Section E-2, Chapter 11.

An important point to note is that the penalties and damages imposed on the mill, indeed, even the threat of closure, were not sufficient to induce the mill to install the treatment necessary to eliminate the use conflicts which precipitated the suit. These same damages and conflicts are still plaguing the Spanish River.

¹ "Cases and Materials on Environmental Law" Professor Wright, Spring 1974. Osgoode Hall Law School. p. IV-143

E. BENEFITS OF WATER POLLUTION ABATEMENT BY THE ONTARIO
PULP AND PAPER INDUSTRY

In this section, the benefits resulting from pollution abatement in pulp and paper mills are analysed using a procedure developed specifically for this study. The objective is to determine just what is gained, in terms of specific benefit categories, by different degrees of water pollution abatement at each mill which is discharging its liquid wastes into the surface waters of the province. The relevant benefit categories are listed in Table IV-4. A benefit is realized if new uses can be made of the receiving waters and if present uses are enhanced in some way. In addition, it is assumed that a benefit is realized even if the improvement occurs on only part of the water system. For example, a benefit is achieved if the effect is realized only in the reach downstream of the mixing zone.

While the benefits listed in Table IV-4 can be quantified to some extent, no dollar values are ascribed. There are three reasons for this. First, the methodologies currently available for estimating the value of environmental benefits are as yet tentative and subject to biases and differing interpretations. Secondly, the implementation

TABLE IV-4

BENEFITS OF POLLUTION ABATEMENT

<u>Category</u>	<u>Benefit</u>	<u>Explanation</u>
1	Water supply.	Is water quality improved to the point where: 1) costs of water treatment are lower? 2) water can be used as water supply where it could not be prior to abatement?
2	Eliminate toxic materials. a) Mercury. b) Other.	N.B. Not relevant (N/R) if mill is not a source of toxic substances in river.
3	Contact recreation permitted. (swimming)	Prior to abatement, swimming is not permitted.
4	Fishing. a) Fish kills eliminated. b) Tainting eliminated. c) Environment for fish species upgraded.	Fishing may refer to commercial, sport fishing or subsistence fishing by Indians.
5	Aesthetics improved. a) Sludge - accumulations stopped. b) Odours eliminated. c) Foaming eliminated. d) Colour normal.	It is assumed that non- contact recreation (i.e. boating, camping, and riparian cottages) is a function of the aesthetic quality of the water in question. Hence, if the aesthetics of a river or lake are enhanced, then so is the potential for these other uses.
6	Protection of unique features.	Are there any unique or special aspects of the water course or of the area in general which will be enhanced or otherwise effected by pollution abatement at the mill in question?

of these methods can be very expensive and the data required to estimate the dollar values of the benefits specified here are not available for many of the relevant water systems in Ontario. Finally, the use of dollar measures for benefits tends to obscure the nature of the benefits. It is important to make these benefits explicit so that decisions can be made on the basis of information about the trade-offs involved in the enforcement of pollution abatement in this industry.

The benefit analysis procedure to be employed here will provide an information base which can be used in several ways. One such use is the establishment of priorities for directing Ministry efforts in achieving pollution abatement. Those mills which yield what are deemed the most important environmental benefits could be brought into compliance with Ministry guidelines first. The Ministry could also establish priorities for multi-mill firms. If the company establishes that it is not able to accomplish the needed abatement in all of its plants at one time, this approach would provide the Ministry with a basis for specifying which mills should be cleaned up first. Finally, specification of benefits in the manner suggested in this sec-

tion can be a more meaningful way of expressing progress in pollution abatement than is expenditure on pollution control, reductions in waste loadings or even changes in specific water quality parameters.

The benefit assessment was accomplished in the following manner:

- (1) A list of benefit categories is specified. They are presented in Table IV-4.
- (2) Three treatment or effluent alternatives are defined.

A = Meet Ministry of Environment effluent objectives for specific mill.¹⁰²

B = Additional treatment or waste loading reduction beyond MOE objectives. Treatment assumed to be technically feasible and commercially available.¹⁰³

C = Close mill permanently.

- (3) The benefits which would be gained as a result of each effluent alternative are specified in terms of the categories listed in Table IV-4.
- (4) The relevant benefits are often subject to many

¹⁰² Ministry of the Environment effluent objectives or requirements which are referred to in this study are specified in "Financial Assistance to the Pulp and Paper Industry to Accelerate the Water and Air Pollution Abatement Programs", Ontario Ministry of the Environment, April 1973, Appendix.

¹⁰³ The nature of this higher level of treatment is unspecified at this time although it would involve some form of dissolved solids removal or process change which could eliminate materials which cause fish tainting or tastes and odours.

qualifications. Two such qualifications are considered here.

- a) If there are no improvements or environmental benefits, what are the reasons?
- b) What conditions or actions are necessary to achieve any benefits in the water system under such consideration?

The analysis, as outlined here, can be carried out at any level of sophistication and detail. The procedure could also be systematized to a greater extent and could be improved considerably by studies at mill locations intended to obtain quantitative information concerning benefit categories.

The benefits gained from pollution abatement are summarized for all of the relevant mills in Table IV-5. Three symbols are used to denote benefits:

- (1) 1 = Benefit or use gained as a result of treatment alternative.
- (2) 0 = No improvement as a result of treatment alternative; pollution problem and conflicts still exist.
- (3) X = Mill effluents currently cause no damages or conflicts concerning the uses or benefits indicated.
- (4) N/R = Use or benefit Not Relevant to the area affected by the mill, even if waste loadings exceed MOE requirements.

In the 'Comments' column of Table IV-5, 'R' refers to the question, "if there are no benefits gained under a particular treatment alternative, what are the reasons? Comments denoted by 'C' refer to the conditions necessary to achieve the benefits listed. Unless otherwise noted, benefits are assumed to be realized within two or three years after implementation of treatment or closure.

An important conclusion which may be drawn from Table IV-5 is that a waste loading reduction (i.e. treatment) beyond

TABLE IV-5

THE BENEFITS OF POLLUTION CONTROL AT PULP AND PAPER MILLS IN ONTARIO

Benefits																
Water Course	Mill	Treatment Alternatives	Water supply	Remove Toxic Material		Swimming	Protection of fish life				Aesthetics				Unique Features	
				Hg	Other		Eliminate	Fish kill	Eliminate	Fish taints	Improve	Fish habitat	Remove sludges	Eliminate smell		Eliminate foaming
Wabigoon R.	Dryden	A	0	1	0	0	0	0	0	0	0	1	0	0	0	(a) Indians downstream - Contaminated food supply (b) Accumulated sludge deposits for 30 miles. Highest accumulations in first 3 miles up to 30-40 feet deep near Wainwright Dam. (c) Traditional technology insufficient to reach MOE effluent objectives.
		B	1	1	1	0	1	1	1	1	1	1	1	1	1	R: Sludge deposits would curtail uses into the future
		C	1	1	1	0	1	1	1	1	1	1	1	1	1	C: (a) Dredging needed to reduce sludge deposits. (b) Channel relocation to bypass some of the mercury contaminated sludge deposits.
Continued																
Benefits:																
Comment:																
R = "If benefits register no improvement, what are the reasons?"																
C = "What conditions, if any, are necessary to achieve the benefits listed?"																
KEY: Treatment Alternatives:																
A = Meet MOE effluent objectives for specific mill.																
B = Additional waste loading reduction.																
C = Close mill permanently																

Continued ...

KEY: Treatment Alternatives:

- A = Meet MOE effluent objectives for specific mill.
 B = Additional waste loading reduction.
 C = Close mill permanently

Benefits:

- 1 = Benefit or use gained.
 0 = No improvement, problem still present.
 X = Currently no damage or use conflict concerning use indicated.
 N/R = Not relevant to area affected by mill.

Comment:

- R = "If benefits register no improvement, what are the reasons?"
 C = "What conditions, if any, are necessary to achieve the benefits listed?"

TABLE IV-5 (CONTINUED)

Benefits

Water Course		Benefits												Comments	
Water Course	Mill	Treatment Alternatives	Water supply	Remove Toxic Material	Swimming	Protection of fish life				Aesthetics					
						Eliminate fish kill	Eliminate fish taints	Improve fish habitat	Remove sludges	Eliminate smell	Eliminate foaming	Eliminate colour	Unique Features		
Spanish R. (Continued)		C	1	N/R 1	1	1	1	1	1	1	1	1	(b) Lower Spanish River runs parallel to Trans-Canada Highway.	(b) Phenols and other dissolved substances must be removed.	
Kapuskasing R.	Spruce Falls & Kimberly-Clark	A	N/R	X 0	1	0	0	1	1	0	0	0	(a) Potential Canoe route to James Bay		
		B	N/R	X 1	1	1	1	1	1	1	1	1			
		C	N/R	X 1	1	1	1	1	1	1	1	1			
Mattagami R.	Abitibi, Smooth Rock Falls	A	N/R	X X	1	1	0	1	1	1	1	1	(a) Potential Canoe route to James Bay	R: Fish tainting substances remain after treatment A.	
		E	N/R	X X	1	1	1	1	1	1	1	1			
		C	N/R	X X	1	1	1	1	1	1	1	1		C: Must remove tainting substances.	

- 299 -

Continued...

KEY: Treatment Alternatives:

- A = Meet MOE effluent objectives for specific mill.
 B = Additional waste loading reduction.
 C = Close mill permanently.

Benefits:

- 1 = Benefit or use gained.
 0 = No improvement, problem still present.
 X = Currently no damage or use conflict concerning use indicated.
 N/R = Not relevant to area affected by mill.

Comment:

- R = "If benefits register no improvement, what are the reasons?"
 C = "What conditions, if any, are necessary to achieve the benefits listed?"

TABLE IV-5 (CONTINUED)

Water Course	Mill	Treatment Alternatives	Water supply	Benefits												Comments
				Remove Toxic Material	Swimming	Protection of fish life				Aesthetics				Unique Features		
						Hg	Other	Eliminate fish kill	Eliminate fish taints	Improve fish habitat	Remove sludges	Eliminate smell	Eliminate foaming		Eliminate colour	
Rainy R.	Ontario-Minnesota	A	1	X	X	0	1	0	1	1	0	1	0	(a) International River with highways on either side-excellent camping or pic-nicking site potential.	R: (a) Alternate A would not eliminate sulfate compounds, hence colour.	
		B	1	X	X	1	1	1	1	1	1	1	(b) Part of Lake of the Woods System.	(b) Problem of high bacterial counts in river not yet resolved.		
		C	1	X	X	1	1	1	1	1	1	1		C: (a) IJC recommendations must be implemented in both U.S. and Canadian mills. (b) Sludge deposits must be removed.		
Winnipeg R.	Ontario-Minnesota, Kenora	A	X	X	X	X	X	0	X	1	0	X	0	Indian Reserve	Effects of mill not great.	

Continued...

KEY: Treatment Alternatives:

- A = Meet MOE effluent objectives for specific mill.
B = Additional waste loading reduction.
C = Close mill permanently.

Benefits:

- 1 = Benefit or use gained.
0 = No improvement, problem still present.
X = Currently no damage or use conflict concerning use indicated.
N/R = Not relevant to area affected by mill.

Comment:

- R = "If benefits register no improvement, what are the reasons?"
C = "What conditions, if any, are necessary to achieve the benefits listed?"

TABLE IV-5 (CONTINUED)

Benefits																
Water Course	Mill	Treatment Alternatives	Water supply	Remove Toxic Material		Swimming	Protection of fish life				Aesthetics				Unique Features	Comments
				Hg	Other		Eliminate fish kill	Eliminate fish catches	Improve fish habitat	Remove sludges	Eliminate smell	Eliminate foaming	Eliminate colour			
Winnipeg R. (Continued)		C	X	X	X	X	X	1	X	X	1	1	X	1		
Trent R.	Domtar, Trenton	A	N/R	X	X	X	X	X	X	X	X	X	X	X	No problem.	
	Miller Bros., A Glen Miller	A	X	X	X	X	X	1	X	1	1	1	1	1	Small discharge.	
Napanee R.	Strathcona P. Co., Strathcona	A	1	X	X	X	1	1	1	X	1	1	1	1	Source of water supply for town of Napanee. C: New guidelines are being drawn up.	
Old Welland Canal	Ontario Paper (Old Welland Canal) Domtar Fine Paper	A	N/R	X	0	N/R	N/R	N/R	N/R	0	0	0	0	0	Flows through a park. Historical value of old canal.	
12-Mile Creek Basin	Domtar Construction Abitibi Fine Paper	B	N/R	X	0	N/R	N/R	N/R	N/R	1	0	1	0	0		
	Kimberly-Clark	C	-	-	-	-	-	-	-	-	-	-	-	-	R: Flow in canal would be cut off.	

Continued...

KEY: Treatment Alternatives:

A = Meet MOE effluent objectives for specific mill.

B = Additional waste loading reduction.

C = Close mill permanently.

Benefits:

1 = Benefit or use gained.

0 = No improvement, problem still present.

X = Currently no damage or use conflict concerning use indicated.

N/R = Not relevant to area affected by mill.

Comment:

R = "If benefits register no improvement, what are the reasons?"

C = "What conditions, if any, are necessary to achieve the benefits listed?"

TABLE IV-5 (CONTINUED)

Benefits

- 302 -

Water Course	Mill	Treatment Alternatives	Water supply	Remove Toxic Material	Swimming	Protection of fish life					Aesthetics				Unique Features	Comments		
						Eliminate fish kill	Eliminate fish taints	Improve fish habitat	Remove sludges	Eliminate smell	Eliminate foaming	Eliminate colour						
Old Welland Canal, 12-Mile Creek Basin (Continued)		(Martindale Pond)																
		A	N/R	X X	1	1	0	1	1	0	X	0			Henley Rowing Course	C: (a) All mills must reach MOE guidelines.		
		B	N/R	X X	1	1	1	1	1	1	X	1			Large population	(b) Flow from Decew Falls generating station.		
Lake Gibson (Lake behind Fibre Decew Falls G.S.)		C	N/R	X X	1	1	1	1	1	1	X	1						
		A	X	X X	N/R	X	X	X	1	1	X	X			(a) Reservoir is the reserve water supply for St. Catharines.	C: (a) Large sludge deposits have to be removed from Lake.		
		B	X	X X	N/R	X	X	X	1	1	X	X				(b) Expansion of mill must have adequate waste disposal.		
Kaministiquia River		C	X	X X	N/R	X	X	X	1	1	X	X			Water for Hydro Electric Generation (Decew Falls)	Access to Lake limited.		
		A	N/R	0 X	0	0	0	0	1	0	X	0			(a) Restored town of Fort William up-stream from mill.	R: (a) Residual mercury in sludges from a source other than the Great Lakes mill.		
		B	N/R	0 X	1	1	1	1	1	1	X	1			(b) A sheltered water-way.	(b) Oil and discharge from a number of other sources.		
Continued...																		
KEY: Treatment Alternatives:		Benefits:																
A = Meet MOE effluent objectives for specific mill.		1 = Benefit or use gained.																
B = Additional waste loading reduction.		0 = No improvement, problem still present.																
C = Close mill permanently.		X = Currently no damage or use conflict concerning use indicated.																
		N/R = Not relevant to area affected by mill.																
		Comment: R = "If benefits register no improvement, what are the reasons?"																
		C = "What conditions, if any, are necessary to achieve the benefits listed?"																

TABLE IV-5 (CONTINUED)

Benefits																
Water Course	Mill	Treatment Alternatives	Water supply	Remove Toxic Material		Swimming	Protection of fish life				Aesthetics				Unique Features	Comments
				Hg	Other		Eliminate	fish kill	Eliminate	fish taints	Improve fish habitat	Remove sludges	Eliminate smell	Eliminate foaming		
Kaministiquia R.	(Continued)	C	N/R	0	X	1	1	1	1	1	1	1	X	1	(c) River flows through city. (d) Extensive commercial shipping use (grain, iron ore, oil, coal).	C: (a) Coordinated cleanup of all dischargers required. (b) City proceeding with construction of an intercepted sewer to eliminate domestic waste.
St. Lawrence River	Domtar, Cornwall	A	X	X	X	X	X	X	X	X	X	X	X	X		C: Coordinated international and interprovincial abatement program required to realize benefits.
St. Mary's R.	Abitibi, Sault Ste. Marie	A	X	X	X	X	X	X	X	X	1	X	X	X		C: International cooperation required to achieve benefits.
Ottawa R.	E.B. Eddy, Ottawa	A	1	X	X	X	X	X	X	X	X	X	X	X		C: (a) Interprovincial abatement program required.
	CIP, Hawkesbury	C	1	X	X	1	X	1	1	1	1	1	1	1		(b) Indicated benefits assume treatment alternative apply to both mills simultaneously.
Continued...																

KEY: Treatment Alternatives:

A = Meet MOE effluent objectives for specific mill.

B = Additional waste loading reduction.

C = Close mill permanently.

Benefits:

1 = Benefit or use gained.

0 = No improvement, problem still present.

X = Currently no damage or use conflict concerning use indicated.

N/R = Not relevant to area affected by mill.

Comment:

R = "If benefits register no improvement, what are the reasons?"

C = "What conditions, if any, are necessary to achieve the benefits listed?"

Continued...

TABLE IV-5 (CONTINUED)

[illegible]

Continued...

KEY: Treatment Alternatives:

A = Meet MOE effluent objectives for specific mill.
B = Additional waste loading reduction.
C = Close mill permanently.

Benefits:

I = Benefit or use gained.
O = No improvement, problem still present.
X = Currently no damage or use conflict concerning use indicated.
N/R = Not relevant to area affected by mill.

Comment:

R = "If benefits register no improvement, what are the reasons?"
C = "What conditions, if any, are necessary to achieve the benefits listed?"

TABLE IV-5 (CONTINUED)

Water Course		Mill	Benefits														
			Treatment Alternatives	Water supply	Remove Toxic Material	Swimming	Protection of fish life			Aesthetics				Unique Features			
					Hg	Other	Eliminate	fish kill	Eliminate	fish taints	Improve fish habitat	Remove sludges	Eliminate smell	Eliminate foaming	Eliminate colour	Comments	
Moberly Bay (Continued)			C	X	X	X	1	X	X	1	X	1	1	X	1		
Peninsula Harbour	American Can		A	0	1	X	0	X	0	X	1	1	0	0	0		
	Marathon		B	-1	1	X	1	X	1	X	1	1	1	1	1		
			C	1	1	X	1	X	1	X	1	1	1	1	1		
Nipigon Bay	Domtar,		A	0	X	0	0	X	0	X	X	1	0	X	0		
	Red Rock		B	1	X	1	1	X	1	X	1	1	1	X	1		
			C	1	X	1	1	X	1	X	1	1	1	X	1		
Thunder Bay	Abitibi		A	0	X	X	0	1	0	0	1	1	0	X	0		R: Water quality problems in Harbour and Bay complex.
	(3 miles)		B	1	X	X	1	1	1	1	1	1	1	X	1		C: Coordinated clean-up of Abitibi mills, Great Lakes and all other pollution sources in Thunder Bay necessary to achieve indicated benefits.
			C	1	X	X	1	1	1	1	1	1	1	X	1		

KEY: Treatment Alternatives:

A = Meet MOE effluent objectives for

specific mill.

B = Additional waste loading reduction.

C = Close mill permanently.

Benefits:

1 = Benefit or use gained.

0 = No improvement, problem still present.

X = Currently no damage or use conflict concerning use indicated.

N/R = Not relevant to area affected by mill.

Comment:

R = "If benefits register no improvement, what are the reasons?"

C = "What conditions, if any, are necessary to achieve the benefits listed?"

that currently required by the Ministry of Environment is necessary to achieve most of the benefits herein specified. It, therefore, behooves this Ministry to carefully assess the extra costs (over and above those required to reach current effluent objectives) of achieving the additional benefits indicated in the table. These are the benefits gained when moving from treatment alternative "A" to treatment alternative "B". Hence, the Ministry should require mills to consider a broader range of technical pollution abatement alternatives so as to be able to assess the incremental costs of achieving more environmental benefits than current effluent objectives will permit.

Another conclusion from Tables IV-3 and IV-5 is that there appear to be few additional benefits that could be gained by closing a mill which could not be achieved through some kind of currently available waste water treatment. Except for the Wabigoon River, it would not be necessary to close any of the mills listed in Table IV-5 in order to restore most of the potential uses which can be made of the respective receiving water systems. Even in the case of the Wabigoon, a restoration of water quality and water uses could be achieved without mill closure but this would involve large capital expenditures for dredging or rerouting the river.

Both of these conclusions certainly require further investigation and empirical verification. However, they point up the need for both the Ministry and the pulp and

paper industry to look more carefully at the incremental costs of different levels of pollution abatement, not just at the total costs of a single unspecified or, at best, ambiguous level of pollution control.

The information provided in Table IV-5 permits comparisons of the consequences of pollution abatement in different mills and on different water systems. Table IV-5 indicates, for each mill or group of mills, approximately what is gained as a result of pollution abatement and whether abatement in the mill alone would achieve these benefits. Some of the more important unique features of each water body or river are also noted in this table. Although the setting of priorities would still be subject to subjective judgments and varying interpretations, the information that has been assembled in Table IV-5 provides a basis for improving the rationality of choices regarding the allocation of resources among all of the mills and the timing of pollution abatement programmes.

CHAPTER V

IMPORTANCE TO
COMMUNITIES

IMPORTANCE TO COMMUNITIES

A. INTRODUCTION

Paper mills often have considerable economic, environmental and social impacts on their respective communities. From an economic standpoint, the mill provides income to its employees who, in turn, support local businesses. The mill may, in fact, be the major source of income for the town. Both the mill and its employees pay property taxes to the community. Conversely, the community must bear certain costs associated with having a mill located near it. The community must support added police and fire protection costs and, in some cases, water and sewage services for the mill. The activities of a mill may also impose environmental costs on the community, particularly as a result of waste disposal practices. Odours from a kraft mill and solid waste disposal usually have an impact on the local community. The effects of water pollution from liquid waste discharges are likely to affect downstream users rather than those who live near or work at the mill. The social implications of "one-mill" towns are ably explored by Rex Lucas in his book, Mine Town, Mill Town, Rail Town.

Economic linkages between the mill and their respective communities are measured in terms of salaries and wages paid by the mill, spending by both mill employees and the mill within the community, taxes paid by the mill to the community and the costs of public services required by the mill. Within each community, there is an expenditure multiplier which is generated as mill employees and the mill itself make purchases to local businesses. These people, in turn, make purchases elsewhere. For example, one dollar paid in wages and salaries by a pulp mill could generate as much as two dollars in spending throughout the community.

However, data are not available to calculate the expenditure multiplier for each mill town. In any event, such measures of economic linkages are relevant only to those communities in which the pulp and paper mill constitutes a relatively small proportion of the total employment and wage earnings. In these communities, cutbacks in production or closure of the mill may or may not result in economic dislocation. This would depend on the alternative employment. In communities where the mill is the only employer, the actual magnitudes of these linkages are irrelevant since it is obvious that the whole town would be seriously affected if the mill were closed.

It is assumed, however, that the Ministry will not force a mill to close because of pollution control or lack of it. This is particularly true if the mill is the only source of employment for the surrounding community. On the other hand, mills could conceivably curtail production or lay off workers as the result of process changes made to achieve pollution control. It is not possible, however, to predict the amount or timing of these cutbacks with the information currently available. The impact of a reduction in output and employment would certainly be more severe in "one-mill" towns than in communities which offer many alternative employment opportunities. Therefore, the proportion of employment provided by the mill has been specified for each relevant community and listed in Tables V-1 through V-3. The proportion of industrial taxes to the total municipal tax income is also presented for each community.

B. MILL EMPLOYMENT

A "one-mill town is defined, for the purposes of this study, as communities meeting one or more of the following criteria:

- (1) The mill is the only industrial employer in the town.
- (2) One mill employs more than 50 per cent of the labour force.
- (3) One mill employs more than 60 per cent of the manufacturing labour force.

There are eleven communities which satisfy one or more of these criteria and are listed in Table V-1. Each of these towns are located in northern Ontario. The mills in two of these communities, Smooth Rock Falls (Abitibi, bleached kraft market pulp) and Marathon (American Can, bleached kraft market pulp) have experienced difficulties in the past and can be expected to present problems in the future if and when kraft pulp markets turn soft.

Four communities listed in Table V-2 depend on the pulp and paper industry for more than 25 per cent of their total manufacturing employment. However, this dependence is offset somewhat in Thorold and in Thunder Bay. Thorold is located in the densely populated Niagara peninsula near St. Catharines and Hamilton. In both cities, alternative employment opportunities include other pulp and

paper mills as well as related forest industries. The five urban centres listed in Table V-3 have substantial alternative employment opportunities other than pulp and paper mills.

C. CONCLUSION

Of the eleven mills classified as "one-mill" towns, only two have had financial difficulties in the past and could become marginally profitable in the event of another extended period of market downturn. The concern about employment is confined to possible production cutbacks rather than mill closure, since it is unlikely that the Ministry will force a mill to close for environmental reasons. Given a "no-closure" constraint, employment in the pulp and paper industry will probably not be unduly affected by the enforcement of environmental objectives. Firms should be required to fully substantiate any claims that environmental controls alone will cause a loss of jobs.

TABLE V-1

"ONE-MILL" TOWNS (1)

Town	Company	Population of Towns (1971)	Manufactur- ing Labour Force	Number of Employees in Mill	Other Manu- facturing Firms	Employees No.	Industrial taxes as a percent of Municipal taxes
Dryden	Dryden Paper (Anglo-Canadian)	6,849		1,440	3	143	42
Iroquois Falls	Abitibi	7,000	1,230	1,230	0		66.5
Espanola	Eddy Forest Prod.	5,871	1,350	1,314	2		43
Kapuskasing	Spruce Falls (Kimberly-Clark) Kimberly-Clark	12,183	2,252	2,155	2		42
Marathon	American Can (2)	2,425		80			
Red Rock	Domtar Pkg.	1,859		702	1	3	50
Smooth Rock Falls	Abitibi	1,204	372	643	0		53
Sturgeon Falls	Abitibi	6,524	1,055	372	0		51
Terrace Bay	Kimberly-Clark (2)	1,839		960	1		36
Kenora	Ontario-Minnesota (Boise Cascade)	10,771	1,909	419	0		50.3
Fort Frances	Ontario-Minnesota (Boise Cascade)	9,632	876	1,157	15		41
				835	6		41

(2) Mills which have had financial difficulties during weak markets.

SOURCE: Ont. Ministry of Industry and Tourism; Industrial Development Branch Industrial Survey 1973, Tor.Ont.

(1) Criteria for "One-Mill" Towns.

1. One mill or company in the town
2. Mill employs 50% of labour force
3. Mill employs 60% of Mfg. labour force

TABLE V-2

COMMUNITIES IN WHICH ONE OR MORE PAPER MILLS
ACCOUNT FOR 25 PERCENT OR MORE OF MANUFACTURING EMPLOYMENT

Town	Company	Population of Town	Total Labour Force	Number of Employees in Mill	Other Manu- facturing Firms No. Employees	Industrial taxes as a percent of Municipal taxes
Thorold (1)	Abitibi Paper Beaverwood Fibre Ontario Paper Dontar Construction Materials TOTAL	15,178	-	823 306 1,454 <u>51</u> 2,634	11 1,340	36
Thunder Bay (1)	Abitibi, Mission Pt. Abitibi, Bare Pt. Abitibi Provincial Paper Great Lakes Paper TOTAL	112,095	35,645	265 364 840 <u>2,530</u> 4,000	148 5,000	39
Cornwall	Dontar Fine P.	47,700	19,200	1,593	51 4,400	33
Huntsville	Kimberly-Clark	9,261		100	12 316	27

(1) Communities in which other paper mills are located within one hour's drive.

SOURCE: Ontario Ministry of Industry and Tourism; Industrial Development Branch,
Industrial Survey - 1973, Toronto, Ontario.

TABLE V-3

COMMUNITIES IN WHICH PAPER COMPANIES ACCOUNT
FOR LESS THAN 10 PERCENT OF MANUFACTURING EMPLOYMENT

Town	Company	Population of Town	Total Labour Force	Number of Employees in Mill	Other Manufacturing No. Employees
Hawkesbury	Canadian International Paper	44,230	9,000	432	15 1,165
North Bay	Canadian Johns Manville	50,000	20,000	236	45 1,828
Ottawa	E.B. Eddy	460,000	192,000	N/A	302 22,000
Sault Ste. Marie	Abitibi	77,968	30,629	433	55 12,267
St. Catharines	Dontar Fine Paper Kimberly-Clark Garden City Paper	112,000	43,861	N/A	208 N/A
				IDLE	

SOURCE: Ontario Ministry of Industry and Tourism, Industrial Development Branch,
Industrial Survey - 1973. - ~~Toronto~~, Ontario.

CHAPTER VI

EVALUATION OF ALTERNATIVE
WATER POLLUTION CONTROL POLICIES FOR
THE PULP AND PAPER INDUSTRY
IN ONTARIO

A. INTRODUCTION

There are a number of factors which pose serious problems for any discussion of alternative policies for controlling water pollution from the pulp and paper industry. These include:

- (1) the extensive range of policy instruments which are available;
- (2) the large number of criteria by which these policy instruments can be assessed;
- (3) the difficulties of undertaking empirical analyses of the policies.

To cope with these problems, the detailed appraisal of alternative policies, which is the main part of this chapter, is preceded by a more general discussion of some key issues and principles in policy analysis. Following this, there is the analysis of specific policies which is based on an empirical study of two pulp mills in Ontario.

1. Policy Programmes and Policy Instruments

A policy instrument refers to a particular device which is intended to aid the achievement of a policy objective. For example, effluent standards supported by fines is a policy instrument for achieving an improvement in environmental

quality. It is frequently desirable to avoid undue reliance on any single policy instrument and so several policy instruments may be combined into a policy programme.

Bearing in mind the significant variations in the form that any policy instrument might take, the major instruments which might be considered for pollution control in Ontario are:

Standards and Guidelines

- (1) Fines
- (2) Control Orders
- (3) Stop Orders

Grants

- (4) Sales Tax Refund
- (5) Accelerated Depreciation
- (6) Tax Credits

Loans

- (7) Market Rates of Interest
- (8) Reduced Rates of Interest
- (9) Repayments Geared to Profits

Other

- (10) Stream Classification
- (11) Land Use Planning
- (12) Effluent Charges

Assume, for simplicity, that some of these measures would not be used simultaneously, so that accelerated depreciation would not be used with tax credits and only one form of loan would be made available. Further assume that if control orders or stop orders are implemented, they would be supported by fines. Even with this small number of policy instruments and these restrictive assumptions there are 959 possible combinations of policies, and 960 if the option of implementing none of them is included. This reduces to 950 policy programmes given the definition of a policy programme as consisting of more than one policy instrument.

In the following section several suggested criteria will be introduced for assessing policy programmes. Quite obviously, it is not feasible to analyse each of these 950 policy programmes in detail though it is useful to make some general observations about them on the basis of three major criteria:

- (1) administrative feasibility
- (2) achievement of environmental goals
- (3) avoidance of undue social and economic repercussions.

It is reasonable to assert that each of the policy instruments being considered is administratively feasible. Many of them are already being used in Ontario and the others are all in use in some form in other jurisdictions. Careful thought would still have to be given to the design of a new

policy programme for pollution control in Ontario but, from experience gained here and elsewhere, the administration of any of these instruments does not pose an insuperable problem.

Regarding the other two criteria, the policy instruments fall into two categories according to their capacity for achieving environmental goals or for avoiding undue social and economic repercussions:

Achievement of Environmental Goals

- (1) Fines
- (2) Control Orders
- (3) Stop Orders
- (4) Stream Classification
- (5) Land Use Planning
- (6) Effluent Charges

Avoidance of Undue Social and Economic Repercussions

- (7) Sales Tax Refund
- (8) Accelerated Depreciation
- (9) Tax Credits
- (10) Loans at Market Rates of Interest
- (11) Loans at Reduced Rates of Interest
- (12) Loans with Repayment Geared to Profits

Any pollution control programme which is intended to achieve environmental goals without inducing undue social and economic repercussions would have to consist of policy instruments selected from these two categories.

2. Criteria for Assessing Policy Programmes

There is no generally accepted criteria for assessing policy proposals and so the choice of criteria to be used in connection with pollution control policies must be somewhat arbitrary. For the purposes of the present study six criteria were selected. These are:

- (1) Environmental effects
- (2) Cost to the company
- (3) Cost to the provincial and federal governments
- (4) Economic and social effects on the area surrounding the mills
- (5) Equity
- (6) Administrative feasibility

A brief discussion of each of these criteria will facilitate their use in the subsequent analysis.

a. Environmental effects: It is difficult to measure the environmental effects of incremental reductions in industrial

waste effluents. However, the benefits of three discrete degrees of effluent reduction were estimated for each mill in chapter IV. These benefits are expressed in terms of improvements in water quality and the additional uses of the water which the different levels of pollution abatement make possible at each mill. This procedure provides a first approximation of the relative environmental improvements resulting from each mill. The benefits estimated for each mill are roughly comparable.

- b. Cost to the Company: For a pollution control policy programme to be effective, it is likely to result in companies increasing their expenditure on pollution control, (unless the government gives a subsidy equal to 100% of the costs, or the pollution control is profitable). Just how much extra expenditure a company will undertake in response to a given policy depends on the nature of the policy and on the technical and economic options available to the company. Estimates of the costs are complicated by the fiscal context in which the company finds itself. It is necessary, therefore, to determine the capital and operating costs associated with pollution control and then to make allowances for the relevant tax provisions to calculate the net cost of pollution control to the company.
- c. Cost to the Provincial and Federal Governments: The cost to these two levels of government of pollution control in pulp and paper industry may be divided into direct and indirect costs. The direct costs include any grant or subsidy given to companies

for pollution control, or, to any tax revenue foregone by government in the form of incentives given to companies to install pollution control equipment. Indirect costs to government include all extra government expenditures or revenues foregone which might ensue from a mill closure brought about by a pollution control policy.

d. Economic and Social Effects in the Area Surrounding the Mills:

It is conceivable that the implementation of a pollution control policy could impose an unbearable financial burden on a mill which would be forced to close. The effects of a mill closure on the surrounding area can range from very severe, when the mill is located in a one industry town, to barely consequential, when alternative job opportunities are available in the affected area. In all cases, the displacement effects of a mill closure can be mitigated by schemes for retraining those who lose their jobs and for lessening the burden of relocation if that becomes necessary.

It should be noted that if a company complies with a pollution control policy by diverting investment funds from production to pollution control then this need have no adverse effects on employment. The crucial factor is the relative labour intensiveness of pollution control as compared with production and this is not something about which generalizations can be made.

e. Equity: There is no generally agreed definition of equity beyond the rather vague notions that equals should be

treated equally and unequals should be treated in a manner consistent with their inequality. (This is based on the assumption, which may not always be appropriate, that the inequality is justified and should not be interfered with by government policies).

With respect to pollution control policies, the question arises of what parameter(s) should be used:

- (1) to compare pulp and paper mills in Ontario with each other;
- (2) to compare pulp and paper mills in Ontario with mills in other jurisdictions;
- (3) to compare the pulp and paper industry in Ontario with other industries in Ontario.

For the first comparison, the more obvious parameters are:

- the extent of the environmental damage caused by each mill,
- the profitability of each mill and/or its parent company.
- the cost of pollution control at each mill,
- the importance of each mill in the local area.

Some of these criteria may also be relevant for the comparison of the Ontario pulp and paper industry with other industries in Ontario and with the pulp and paper industry in other jurisdictions. In both cases it may be argued that the pulp and paper in Ontario should not be

expected to incur pollution control costs which are unduly greater than the costs incurred by other industries in Ontario and by the pulp and paper industry elsewhere.

f. Administrative Feasibility: In principle any pollution control policy can be administered providing sufficient funds for the administration of the policy are made available. Administrative feasibility becomes, therefore, a question of costs.

The major categories of administration costs relate to data requirements, staffing and support costs, and court costs.

3. Economic Incentives and Financial Assistance

There is an essential difference between an economic incentive and financial assistance. An economic incentive is a financial penalty which is imposed in order to discourage (or encourage) a certain specified form of behaviour. Financial assistance merely lessens the costs incurred by the recipient of the assistance when certain specified actions are undertaken.

In the case of pollution control policies, financial assistance can take the form of loans and grants to companies for installing pollution control equipment. Economic incentives for pollution control include financial penalties imposed on companies according to the quantity of effluent they discharge. With financial assistance of less than 100% of the costs, companies are still obliged to incur expenses for pollution control. For this reason

they will still be reluctant to reduce their effluent discharges unless they are subjected to other penalties, such as fines, for not doing so. Economic incentives, in contrast, operate so that a company which reduces its effluent also reduces its liability for paying an effluent charge, if that is the form that the incentive takes. It may be concluded, therefore, that economic incentives for pollution control are likely to be far more effective than financial assistance for improving environmental quality objectives. As indicated earlier, financial assistance is better regarded as an instrument for the avoidance of undue social and economic repercussions rather than for the achievement of environmental goals.

B. THE CURRENT POLICY PROGRAMME

1. General Description

The current policy programme consists of:

- water quality and effluent quality objectives supported by: fines, control orders, and stop orders
- financial assistance in the form of: an accelerated depreciation allowance on capital expenditures for pollution control, and a refund of sales tax on pollution control equipment.

Acting under the Ontario Water Resources Act and the Environmental Protection Act¹ the Ministry establishes targets or objectives for the effluent loadings from each existing mill and then seeks agreement with each company on a programme of pollution control that will meet the Ministry's objective. These programmes specify the kind of equipment that will be installed and the timing of the installation. The Ministry's objective for each mill is loosely based on a desired quality of the receiving water body and the desired quality is always subject to upward revision. Consequently, no mill can regard its pollution control programme, even if it has been agreed to by the Ministry, as an ultimate goal since, in due course, the Ministry will be upgrading

¹ The Ontario Water Resources Act, Revised Statutes of Ontario, 1970, chapter 332 as amended by 1972, chapter 1 s.70, October 1972.

The Environmental Protection Act, 1971, Statutes of Ontario, 1971, Chapter 86, as amended by 1972 Chapter 1 s. 69, and 1972, Chapter 106, January 1973.

its quality objectives for the receiving water body and for the effluent which the mills discharge into it.

The situation for the establishment of new mills in Ontario is similar to that for existing mills except that the Ministry can exercise stronger and more immediate control over a mill which has yet to be built. Such a mill has to have pollution control equipment that meets the Ministry's current requirements. Subsequent to this, however, a new mill has to meet increasingly stringent standards in the same way as any other mill.

In principle, the Ministry of the Environment is able to enforce its policy for pollution control by using the provisions for fines, stop orders and control orders that were established by the Ontario Water Resources Act. (See Chapter II for a full discussion of these provisions). In practice, the Ministry has been reluctant to utilize these powers of enforcement, preferring to seek the cooperation of the companies concerned. This approach has met with only limited success in achieving effluent control by the pulp and paper industry.

In addition to the provincial requirements, all pulp and paper mills are subject to the federal standards which are outlined in Appendix C. These standards are administered

by the provincial authorities which is convenient for both governments, except that problems may arise when provincial and federal requirements are in conflict so that a decision has to be made about which requirements will be met first.

The other aspect of the prevailing situation governing pollution control in the pulp and paper industry relates to the tax provisions which are intended to encourage expenditure on equipment for pollution control. Provincial sales tax is refundable on such expenditures and pollution control equipment may be depreciated over a period of not less than two years. The net effect of these provisions on a company which can take advantage of them (accelerated depreciation is only advantageous to a company which is making sufficient profits against which it can offset the cost of the pollution control equipment) is that the actual cost to the company of installing and operating the equipment can be significantly less than the capital and operating costs of the equipment.

2. Assessment

a. Environmental Effects

An assessment of the environmental effects that would result if each mill met the Ministry's effluent requirements

was reported in Chapter IV. It is significant to note that only five mills would require additional treatment over and above that needed to meet Ministry effluent objectives so as to completely eliminate water quality problems. Four other mills are located on rivers so large that the effluent reduction at these establishments would have little observable effect on water quality. In addition, twelve mills discharge waste water effluents into the same three receiving waters. Abatement in just one of these mills would not necessarily result in improved water quality or environmental benefits. This would require simultaneous abatement in all mills discharging into the same receiving waters. In only one mill is it the case that technically feasible treatment methods may not result in any improvement in water quality. In all other cases it is apparent that the same environmental benefits that would be achieved by mill closure could be obtained by installing currently available treatment technologies.

While it is likely that the Ministry will raise its pollution control requirements for some mills, there are obvious limits to this process. The establishment of Ministry effluent objectives appears to be implicitly influenced by judgement about the economic feasibility of the abatement technology and the location (i.e. environmental impacts) of each mill. The locational aspects of current policy will be examined subsequently.

With reference to the study of Eddy Forest Products, Espanola, and Abitibi, Iroquois Falls mills, it is interesting

to note that the Ministry's recommended treatment for these mills would not meet the Ministry's requirement for BOD₅ discharges.² This is shown in Table VI.1.

b. Cost to the Company

There are several reasons why it is difficult to estimate the cost to a company of any particular pollution control programme. It is necessary to determine the capital and operating costs associated with pollution control and then to make allowances for the prevailing tax provisions to calculate the net cost to the company of the pollution control. This calculation is complicated by the fact that some tax provisions are only of benefit to a company if it is making substantial profits. This applies particularly to the accelerated depreciation allowable on pollution control equipment. Furthermore, the costs of any pollution control programme extend over time and so, to compare one stream of costs with another, a discounting procedure must be used, by means of which all pollution control costs are measured in terms of their present value to the company.

Appendix G contains a detailed analysis of the costs of alternative pollution control programmes at two mills

² All references to the current provincial requirements for effluent quality and the associated recommended treatment programmes are based on the document: Financial Assistance to the Pulp and Paper Industry to Accelerate the Water and Air Pollution Abatement Programmes, Ministry of the Environment, April 1973. This is referred to throughout as the Turner Report.

TABLE VI 1

AN ASSESSMENT OF THE EFFECTIVENESS OF THE MINISTRY'S RECOMMENDED TREATMENT PROGRAMMES FOR ACHIEVING A REDUCTION IN BOD₅ DISCHARGES^a

	Treatment Alternative Nos.	Ministry Recommended Treatment	Effluent Data (BOD ₅ tons/day)		
			Before Treatment	After Treatment	Ministry Requirement
Eddy Forest Products Espanola	163		35.29	12.17	5.0
	165		35.29	14.61	5.0
Abitibi Iroquois Falls	35		62.00	16.25	7.5
	36		62.00	16.35	7.5

^a All data are taken from Appendix G.

in Ontario. The difference between the present value of the costs of each treatment alternative (Appendix G pages 15-20, 27-28, S2-S3) for cases 2, 3 and 1 are attributable to the tax provisions that were used in the analysis and the 15% discount rate. Case 2 represents the market price of the capital and operating costs of the pollution control programmes (net of Provincial sales tax which is refundable under the Pollution Abatement Incentives Act). The companies only bear a portion of these costs since, by virtue of the tax provisions, their post-tax profits are reduced by an amount that is less than the market price of the pollution control programme that they select. It is in this sense that the government, by foregoing tax revenues that it would otherwise collect, bears part of the costs for industrial pollution control. Case 2 therefore shows the costs to the companies only when they are unable to take advantage of the relevant tax provisions and this will occur when their profits, prior to expenditures on pollution control, are zero or negative.

In case 1, the costs to the companies are estimated on the assumption that there is a two year write-off⁴

³ 15% is the discount rate used in the present value calculations contained in Environmental Control and the Pulp and Paper Industry of Canada Canadian Pulp and Paper Assoc., December 17, 1971, p. 10.

⁴ This rate of accelerated depreciation is allowed on property of class 24 as specified in the Income Tax Act 45th Edition 1973-74.

on capital equipment purchased for pollution control and a corporation profits tax rate of 49%⁵. Case 3 shows the costs to the companies under normal depreciation of 20%⁶ per year of the undepreciated balance.

It is apparent from Appendix G that the tax provisions can make a very substantial difference in the costs to companies of pollution control. Since the depreciation allowances only apply to capital expenditures and not to operating and maintenance costs the costs to the companies of programmes of pollution control are reduced by greater amounts in direct relation to their capital intensity. (The bias that this is likely to introduce to the selection of pollution control programmes is discussed on pp. 387-389). For each \$1 million, in present value terms, of capital costs at market prices a company's post tax profits declines by \$1 million if it has insufficient profits to allow it to use the available depreciation allowances; \$720,000 if equipment is subject to normal depreciation of 20% of the undepreciated balance,

⁵ This will be the combined Federal and Provincial rate for 1975. In 1974 the combined rate is 50% (See the Income Tax Act 45th Edition 1973-74)

⁶ This is the rate applicable to property of class 8 as specified in the Income Tax Act 45th Edition 1973-74. The calculations in the Supplement to Appendix G are based on this depreciation rate, and may be compared with the calculation contained in the main body of Appendix G which are based on straight line depreciation over 25 years.

and \$600,000 if a two year write-off is allowed. In addition to the depreciation allowances, a company can also deduct its interest payments on borrowed funds from its taxable income. If the interest rate is 15% per year and the corporation profits tax rate is 49%, as assumed in this study, then the total reduction of a company's post tax profits, as a result of \$1 million of capital expenditures is \$280,000 under normal depreciation and \$160,000 under accelerated depreciation.*

Care should be used in interpreting the cost figures in Appendix G under case 1 since they are based on the assumption that all the capital expenditures in each alternative treatment programme are eligible for accelerated depreciation. This may not be the case since this tax provision is reserved only for expenditure which is primarily for pollution control, and it is not clear whether a switch to oxygen bleaching in the Eddy mill and the installation of a chemical recovery plant in the Abitibi mill, will be classified as pollution controls for tax purposes. To account for this possibility a simple adjustment to the figures can be made:

- (1) If capital expenditures for oxygen bleaching in the Eddy mill can only be depreciated at the normal rate then \$0.56 million must be added to the costs

* When interest payments are tax deductible the discount rate should be revised downwards. This would increase these present value estimates of costs.

listed under case 1 for all treatment programmes which include oxygen bleaching (Appendix G pp 15-29).

- (2) If capital expenditures for chemical recovery in the Abitibi mill can only be depreciated at the normal rate then \$1.05 million must be added to the costs listed under case 1 for all treatment programmes which include chemical recovery (Appendix G, pp 27-28).

These various considerations are reflected in Table VI 2 under the heading "partial accelerated depreciation. The table records the estimated cost to Eddy Forest Products and Abitibi, Iroquois Falls of the Ministry's recommended treatment programmes for these mills. The costs are shown as present values at market prices, and as the reduction in the companies profits when full or partial accelerated depreciation is used.

TABLE VI 2

COSTS TO COMPANIES OF INSTALLING THE MINISTRY'S RECOMMENDED TREATMENT PROGRAMMES

	Treatment Alternative Nos.	Market Prices (Case 2)	Cost to the Mill (\$M)	
	(Ministry Recommendation)		Accelerated Full	Depreciation Partial
Eddy Forest				
Products -	163	9.07	3.04	3.04
Espanola	165	7.55	2.53	3.53
Abitibi	35	10.49	1.58	2.63
Iroquois Falls	36	9.91	1.15	2.20

A rough estimate of the cost to the industry of the Ministry's recommendations for pollution control may be obtained by applying the existing tax provisions to the market price estimates given in the Turner Report (p. 3). Using a discount rate of 15% and allowing for a 20% increase in the costs of pollution control from 1973-1974, the present value of the Ministry's programme is \$65.76 million. As the following section shows, the combined contribution of the provincial and federal governments in terms of tax revenue foregone, is approximately 75% of the costs of pollution control. Therefore, the cost to the entire industry of the Ministry's current programme, in terms of the decline in the present value of post tax profits, is \$16.44 million.*

c. Cost to the Provincial and Federal Governments

As explained earlier, the costs to government of pollution control in the pulp and paper industry can be identified as direct and indirect.

With respect to the Ministry's current policy programme it is most unlikely that any mill would be forced to close because of pollution control and so there would be no indirect costs to government from this cause. Some indirect costs might be associated with the discouragement by the

* See footnote on page 334. More recent estimates of costs are reported in the Summary and Update.

Ministry of a mill expansion or the establishment of a new mill in Ontario but these costs are not considered here.

By virtue of the Pollution Abatement Incentive Act⁷ the Minister of the Environment for Ontario can refund the provincial retail sales tax paid on equipment purchased for the abatement of pollution or the treatment or disposal of waste. This amounts to revenue foregone of approximately \$10 million, based on the estimate contained in the Turner Report of the costs of installing equipment to meet the Ministry's requirements for pollution control in the pulp and paper industry.⁸

In the absence of special depreciation allowances for pollution control, normal depreciation allowances would be permitted. The cost to government of full and partial accelerated depreciation is therefore the reduction in costs to the company when accelerated rather than normal depreciation is allowed.

Given the prevailing rates of corporation tax (37% on taxable income at the federal level and 12% on taxable income at the provincial level) the provincial government bears 32% of this cost and the federal government bears the remainder.

⁷ The Pollution Abatement Incentive Act Revised Statutes of Ontario, 1970 Chapter 352 as amended by 1972, Chapter 1, s. 72, August 1973.

⁸ The costs were raised by 20% to allow for cost increases between 1973 and 1974.

In terms of the two mills that were studied intensively the costs to the federal and provincial governments of implementing the province's requirements for pollution control may be derived by subtracting columns 3 & 4 of Table VI 2 from the figures for Case 3 given in the supplement to Appendix G. The present value of these costs, allocated to the two levels of government, are recorded in Table VI 3 where the cost to the province also includes refunded sales tax on capital expenditures for pollution control.

TABLE VI 3

THE DIRECT COSTS TO GOVERNMENT OF THE MINISTRY'S CURRENT PROGRAMMES FOR TWO MILLS

Treatment Alternative Nos. (Ministry Recommendation)		Costs to Government \$M			
		Full Accelerated		Partial Accelerated	
		Depreciation		Depreciation	
		Prov.	Fed.	Prov.	Fed.
Eddy Forest Products	163	.48	.33	.48	.33
Espanola	165	.41	.30	.41	.30
Abitibi	35	1.17	.87	.83	.16
Iroquois Falls	36	1.21	.90	.87	.18

It should be noted that the direct costs recorded in Table VI 3 are not the same as the decline in government revenues which would result from the installation by the two mills concerned of the Ministry's recommended method of pollution control. This can be estimated, in present value

terms by subtracting the cost to the companies of the pollution control programmes from the costs of these programmes at market prices. The results of such a calculation are shown in Table VI 4.

TABLE VI 4

THE DECLINE IN GOVERNMENT TAX REVENUES RESULTING FROM THE ADOPTION BY TWO MILLS OF THE MINISTRY'S RECOMMENDED METHOD OF POLLUTION CONTROL

Treatment Alternative No. (Ministry Recommendation)		Revenue Foregone \$M			
		Full Accelerated		Partial Accelerated	
		Depreciation		Depreciation	
		Prov.	Fed.	Prov.	Fed.
Eddy Forest Products	163	1.93	4.10	1.93	4.10
Espanola	165	1.61	3.41	1.61	3.41
Abitibi	35	2.85	6.06	2.52	5.34
Iroquois Falls	36	2.80	5.96	2.47	5.24

In order to obtain a rough estimate of the costs to government, in terms of foregone revenues of the industry wide programme that is detailed in the Turner Report, the foregone revenues resulting from compliance in the Abitibi, Iroquois Falls and Eddy, Espanola mills can be taken as representative of the whole industry. The average of the costs of the four pollution control programmes shown in Table VI 2 is \$9.26M. The average of the government's foregone revenues as shown in Table VI 4 is \$2.22M for the provincial government and \$4.7M for the federal government.

This means that the provincial government bears 24% of the costs and the federal government bears 51% of the costs.

As explained in the previous section, the present value, at a discount rate of 15%, of the cost of the industry programme recommended in the Turner Report (P. 3) is \$65.76M, allowing for a 20% increase in prices. This is equivalent to an annual stream of costs extending over 25 years of \$10.17M/year. Using the percentage share of the costs that were derived above, the provincial government's share of these costs would be \$2.44M per year and the federal government's share is \$5.19M per year.*

d. Economic and Social Effects on the Area Surrounding the Mills

If the Ministry of the Environment was to use its extensive power under the Environmental Protection Act, to issue control orders and stop orders and to prosecute companies under the several provisions of the act that are detailed in Chapter II, then the closure of mills that would result would have significant economic and social effects in many mill towns. This is particularly the case in those towns where the mill is the main employer in the area.

* See footnote on page 334.

The dependence of each community on its respective pulp and paper mill in terms of employment is summarized in Chapter V. It is notable that in 10 communities in Ontario pulp and paper mills are directly responsible for more than 50% of the employment in the area, and indirectly responsible for much of the other employment. Permanent closure of any of these mills would necessitate evacuation of the towns unless alternative employment on a substantial scale was made available.

It is apparent from the Ministry's past record of enforcement of the provisions of the Acts under which it operates that without a change of philosophy, as discussed in the Turner Report (pp 8-15), it is most unlikely that the Ministry would close a mill which failed to meet the specified environmental objectives. Consequently, no significant economic and social effects can be said to result from the Ministry's current policy as it is applied in practice.

Regarding the Eddy mill and the Abitibi, Iroquois Falls mill, strict enforcement of the Ministry's policy would be most unlikely to force the mills to close. As Section F 5, Chapter III, of this study shows, both mills appear to be in a strong financial position so that they would be able to bear the costs of meeting the Ministry's requirements.

e. Equity

Considerations of equity can be based on various factors such as:

- the extent of the environmental damages caused by the mill's activities
- the profitability of the mill and/or its parent company
- the cost of pollution control at each mill
- the importance of the mill to the local area

The current policy of the Ministry is pragmatic in the sense that each of these considerations enters into the establishment of the Ministry's objectives for a mill and the pressure brought to bear by the Ministry on complying with the Ministry's requirements. By this means the Ministry seeks to achieve its over-all objective of raising the quality of water in Ontario without treating any particular mill with undue harshness.

Despite the good intentions which underline this policy it does give rise to some apparent inequities. An analysis of the data in the Turner Report reveals that the cost per lb/day reduction in BOD₅ that is implied by the Ministry's requirements for each mill ranges from \$36 at

Domtar Packaging Ltd., Trenton to \$200 at The Ontario-Minnesota Pulp and Paper Co. Ltd., Kenora. Notwithstanding the fact that part of this disparity can be accounted for by reductions in other kinds of pollutants besides BOD₅, and bearing in mind that these costs have increased since April 1973, when they were estimated, it is hardly equitable to require one company to spend money on pollution control at a cost per unit of reduction in BOD₅ of 6 times that is required of another company (Note that these are pre-tax figures. The post-tax disparities, however, are likely to be just as large).

It might be argued that BOD₅ is not an adequate measure of the environmental impact of a mill's effluent and that a broader view of the matter would show that although \$1/lb. of BOD₅ reduced varies greatly from mill to mill, \$1/unit of environmental impact reduction is roughly the same. If this is the case, and nowhere has it been demonstrated, then the Ministry's programme for pollution control at the Ontario mills could be said to be equitable in that the Ministry is imposing equal costs on mills responsible for equal environmental impacts.

By relating the cost per lb. reduction in BOD₅ data from the Turner Report to the water quality data contained

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in chapter IV and Appendices E and F, it transpires that no systematic relationship exists between the costs that the Ministry seeks to impose on each mill for a unit reduction in BOD_5 and the consequent improvement in water quality. It is not possible, therefore, to describe the Ministry's current programme as equitable in these terms.

In view of the Ministry's reluctance to impose its will in the case of a barely profitable mill, the de facto policy of the Ministry, to require expenditure on pollution control only by companies that are sufficiently profitable to afford it, might be regarded as equitable. This criterion of equity is certainly relevant when the effects on those people who rely on the mills for their livelihood are considered, but this is not central to the problem of equity among mills. Profitability arises in another connection however, in that the Federal and Provincial Governments, by means of the accelerated depreciation on pollution control expenditures, share a substantial part of these costs imposed on mills, but only if the mills are making sufficient profits to allow them to depreciate their expenditures rapidly. It does not seem equitable for the two governments to give the greatest financial assistance to the most profitable

companies, but that is the way the current policies operate. With reference to the Eddy mill at Espanola and Abitibi, Iroquois Falls, taking account of tax deductions and operating costs (both of which are omitted from the Turner Report), the relevant data pertaining to the above arguments are displayed in Table VI 5.

TABLE VI 5

A COMPARISON OF THE GOVERNMENT AND COMPANY COSTS OF THE ADOPTION OF THE MINISTRY'S RECOMMENDED POLLUTION CONTROLS AT TWO MILLS *

Treatment Alternative Nos.	<u>Decline in \$M</u>		Reduction in BOD ₅ Tons/Year	<u>\$/lb. BOD₅ Reduction</u>	
	Gov't Revenues	Post Tax Profits		Gov't.	Mill
Eddy Forest					
Products 163	4.84	4.23	8,057	.30	.26
Espanola 165	3.99	3.56	7,203	.28	.25
Abitibi - 35	8.91	1.58	16,013	.28	.05
Iroquois Falls 36	8.76	1.15	15,978	.27	.04

Table VI 5 shows that the current policy as applied to these two mills involves the government in taking a much larger share of the costs of the Abitibi mill at Iroquois Falls than of the costs of Eddy mill at Espanola. (Both companies are assumed to be able to take full advantage of all the tax provisions). It is hardly likely that this was

* See footnote page 345.

intended by the provincial or federal authorities and does not seem to satisfy any criterion of equity. The only relation that is remotely consistent in this comparison of the two mills is the governments' contribution per pound of reduction in BOD_5 . If partial accelerated depreciation was used to bring the governments' total contribution to each mill more into line (since it only reduces the governments' contribution to Abitibi's costs) then this would increase the difference in contribution per pound of BOD_5 reduced that is shown in Table VI 5.

There remains one important point relating to the equity of the Ministry's current policies as among Ontario's pulp and paper mills. It has already been stated that the Ministry's policy is a process of constant negotiation and revision of mill requirements. Consequently, the equity of this policy could be more adequately assessed over time and not merely at a point in time as has been attempted here. This is particularly relevant if equity is defined in terms of the total expenditure on pollution control at each mill since the disparity in the Ministry's requirements for each mill might reflect past expenditures by some mills which have not been matched by the others.

The limited data that are available in the Turner Report on the cost of treatment already installed do not support this hypothesis, though it is recognized that the data are incomplete since the extra costs involved in building in pollution control at the outset rather than adding it on are not recorded.

Turning now to the equity considerations as among industries rather than mills, it is the case that the Ministry's policy towards the pulp and paper industry is part of a general approach to water pollution problems from all industries in Ontario. On these grounds, therefore, it can be argued that from the Ministry's point of view each industry in Ontario is subject to similar requirements.

The perception of the pulp and paper industry of the Ministry's policy, however, may well differ from the Ministry's own perception since the Ministry is seeking much greater expenditures on pollution control by the pulp and paper industry than by any other industry. This is because the pulp and paper industry is responsible for a disproportionate share of the water pollution in Ontario.⁹ Nevertheless, the pulp and paper industry is reluctant to incur costs which

⁹ Status of Industrial Water Pollution Control in Ontario as of December 31, 1973. Industrial Wastes Branch, Ministry of the Environment, June 1974.

are not required of other industries whatever the reason happens to be. The industry's representatives have called for a greater contribution by the government towards the costs of pollution control, but as has been shown above, the industry is already relieved of a substantial share of the costs by virtue of the tax provisions that apply to expenditures on pollution control.

The other aspect of equity among industries relates to the treatment of the Ontario pulp and paper industry compared with the treatment of the pulp and paper industry elsewhere in Canada and in other countries. As section E-5 in Chapter III shows, the existing pollution control policies in Ontario are not necessarily more strigent than those being imposed in U.S.A., Sweden, Quebec and British Columbia. Nor does it appear that the level of pollution control expenditures required for Ontario mills are any greater than those required in these other jurisdictions.

f. Administration

The administration of the Ministry's current policy is the responsibility of the newly formed Pollution Control Branch which works in close co-operation with the Regional Offices of the Ministry. Mills are required to monitor their own effluents and to submit monthly reports to the Ministry which can check the reports by taking its own samples.

The practice of working closely with each mill without public observation, let alone participation of the process, has left the Ministry open to accusations of "being in bed with the companies".¹⁰ Whether or not this is the case, the method of administering the Ministry's current policy makes it impossible for the Ministry to refute this charge.

At a more technical level, the administration of a policy which involves the establishment of a pollution control programme for each mill, in a way that takes account of all the considerations that were mentioned earlier, requires intimate knowledge of each mill and each company. This is part of the rationale for the present study which was conceived in order to increase the Ministry's information about some of the economic and social aspects of the Ontario mills. As is explained more fully elsewhere, the necessary data were often impossible to obtain from any source, and much of the available data came from the mills themselves. For the time being therefore, the Ministry will continue to depend on the mills for much of the economic and environmental data which it needs for the successful implementation of its present policy. The reliability of this data may become questionable if, at any time, the Ministry should adopt

¹⁰ Environment on Trial Ed. David Estrin and John Swaigen
Canadian Environmental Law Association 1974

a firmer line in imposing its requirements on the mills. And in the event of court proceedings it is questionable whether data that were not checked independently by the Ministry could be successfully used against the mill responsible for its collection. (These legal issues have been more fully explored in Chapter II).

C. AN ALTERNATIVE POLICY PROGRAMME EMPLOYING A CONVENTIONAL EFFLUENT CHARGE

1. General Description

This section is devoted to an analysis and assessment of policy programmes which incorporate an effluent charge of the conventional type. The concept of an effluent charge has a well established place in the economic theory of pollution control. In its simplest form, companies would be liable for a payment to the government according to the amount of effluent they discharge. In a more sophisticated version this payment might also be dependent on the quality and composition of the effluent, the fluctuations in its flow, the time at which it is discharged, and the state of the receiving water and its alternative uses.

The basic principle for setting the effluent charge is that it should be directly related to the damage caused by the effluent. If the damage per unit of effluent can be

measured in monetary terms then it is conceptually simple to set the appropriate charge. This charge will then act as an incentive for companies to reduce the effluent loading for which they are responsible. Providing it is cheaper for a mill to install pollution control equipment than to pay the effluent charge, and this depends on the size of the charge and the cost of pollution control, the firm will reduce its discharge of effluent rather than pay the charge. This does not mean, of course, that a mill will either curtail its pollution completely or pay the charge and continue to discharge as before. A company which seeks to incur the lowest costs possible for a given level of production will attempt to find a balance between pollution control and payment of the effluent charge.

This general description of an effluent charge should not obscure the fact that effluent charges can be designed in many different ways to serve a variety of purposes. Some of these possibilities will be introduced in the following sections, and Table VI 6 summarizes the principle purposes that can be served by different formulations of an effluent charge.

TABLE VI 6

VARIETIES OF EFFLUENT CHARGES AND THE PURPOSES THEY CAN SERVE

PURPOSE OF THE EFFLUENT CHARGE

Effluent Charge (\$/Unit of Time) Based on:	To Raise Revenue	To Supplement Environmental Standards or Objectives	Primary Instrument for Pollution Control, Supplemented by Environmental Standards or Objectives	To Optimize the Use of a Water Basin
Quantity of Effluent Flow (gallons)	X	X		
Quantity & Composition of Effluent (Weighted sum of gallons and tons)	X	X		
Quantity & Composition of Effluent, Condition of Receiving Water (Weighted sum of gallons and tons)	X	X	X	
Damage caused by Effluent (\$)	X	X	X	X

KEY: X indicates that a particular formulation of an effluent charge can, in principle, achieve specified purposes.

2. ASSESSMENT

a. Environmental Effects

It was noted above that there are several bases on which an effluent charge can be levied. If each of these bases is regarded as a characteristic or combination of characteristics of the effluent then an effluent charge will tend to discourage the particular characteristics of the effluent which are penalized. Thus, if a charge is levied solely on the quantity of the effluent, companies may be expected to reduce the quantity of effluent they discharge. At the same time, however, they may well be induced to increase the concentration of contaminants in their effluent flow. If this happens then despite the decrease in the quantity of effluent discharged, the environmental effects of the more concentrated effluent may be more serious than the effects of the greater quantities of the more dilute effluent.

The question that has to be addressed therefore, is whether a particular formulation of an effluent charge is likely to induce changes in the quantity, quality and timing of the effluent flow that will reduce or increase the environmental effects of the effluent? If the effluent charge is effectively related to damage caused, then the likely

result of an effluent charge is to reduce the damage. In the event that no convenient, unambiguous measure of damage is available (e.g. a dollar measure), then an effluent charge based on the primary damage causing characteristics of an effluent is the next most likely to induce a reduction in the environmental damage. As the basis of the effluent charge becomes less inclusive then the danger increases that companies will respond by modifying their effluent in a way that is environmentally harmful.

A popular base for an effluent charge in the extensive literature on the subject is biological oxygen demand. (BOD_5). For the reasons discussed it would be preferable to apply the charge to a weighted sum of BOD_5 and other easily measurable characteristics of the effluent such as suspended solids and flow. However, for the purpose of examining the effect of an effluent charge on the mills at Espanola and Iroquois Falls, it is necessary to restrict the scope of the charge to BOD_5 since this is the only parameter for which data are presently available for both mills.

Table VI 7 presents data that are drawn from Appendix G. The top section of the table applies to the Eddy Forest Products mill and bottom section applies to the Abitibi mill. The pollution control programmes, which are referred

to by their Alternative Numbers, are the cheapest ways for the mills to achieve progressively greater reductions in their discharge of BOD_5 . Costs are measured in terms of an equal annual payment over 25 years which has the same present value, at a 15% rate of discount, as the programme costs recorded in Appendix G. (Note that in Table VI 7, the costs are based on Case 1 but with normal depreciation period for oxygen bleaching and chemical recovery.). The negative costs of most of the programmes for the Eddy mill reflect the substantial profitability of installing oxygen bleaching. The effect on the costs to the mill of different rates of effluent charges levied on BOD_5 discharged is shown in the last 6 columns of Table VI 7. Each figure in these columns shows the equivalent annual cost to the company, over 25 years, of a particular pollution control programme in conjunction with a specified rate of effluent charge. Thus, programme 146 and an effluent charge of 4 cents/lb. BOD_5 would cost Eddy Forest Products \$12,000/year for 25 years. It is possible, therefore, to determine what programme of pollution control each mill will select in order to minimize its combined costs of installing equipment and payment of the charge for any of the 6 rates of effluent charge considered. For example, if an effluent charge of 2 cents/lb. BOD_5 were

imposed Eddy Forest Products could minimize its costs by implementing programme 68, thereby reducing its daily discharge of BOD_5 from 35.29 tons to 10.11 tons. Similarly, Abitibi could respond to an effluent charge of this magnitude by selecting programme 3, and so minimize its combined effluent control and effluent charge costs.

On the assumption, then, that the pulp and paper companies seek to minimize the costs they incur from their production of marketable products, it is possible to predict the effects on BOD_5 discharges of various rates of an effluent charge. With respect to the Eddy mill and the Abitibi mill, Table VI 7 shows the pollution control programme and consequential BOD_5 discharge that minimizes the companies' costs when an effluent charge is imposed. These minimum costs for each rate of effluent charge considered, are shown in parentheses.

It is evident that higher effluent charges tend to encourage increased expenditures by a company on pollution control. This is because the higher the effluent charge, the more worthwhile it is for a company to install expensive equipment in order to reduce its effluent discharge and hence the payment due on the discharge of effluent. It follows, therefore, that to achieve a desired level of water quality at a particular mill location, the size of the

TABLE VI 7
LEAST COST ANALYSIS OF POLLUTION CONTROL AT TWO MILLS INCLUDING AN EFFLUENT CHARGE

EDDY FOREST PRODUCTS, ESPANOLA

Alternative Number	BOD ₅ (Tons/day)	Equivalent Annual Cost (\$000) of Program over 25 Years - CASE 1*	Annual Cost for Company (\$000) Including an Effluent Charge at Cents/lb BOD ₅	0	1	2	4	8	10
5	35.29	0	0	247	494	988	1,976	2,470	
11	22.91	-478	(-478)	-318	-158	162	802	1,122	
12	16.41	-453	-453	(-338)	-223	7	467	697	
76	10.98	-399	-399	-322	-245	-91	217	371	
68	10.11	-387	-387	-316	(-246)	(-103)	181	323	
56	9.61	-327	-327	-260	-193	-59	209	343	
100	8.74	-283	-282	-222	-161	-39	205	327	
92	7.51	-241	-241	-188	-135	-29	183	289	
154	7.04	-214	-214	-165	-116	-18	178	276	
146	5.53	-144	-144	-105	-66	12	(168)	(246)	
205	3.97	20	20	48	76	132	244	300	

ABITIBI, IROQUOIS FALLS

1	62.00	0	(0)	434	868	1,736	3,472	4,340	
2	61.15	31	31	459	887	1,743	3,455	4,311	
3	17.00	133	133	(252)	(371)	(609)	1,085	1,323	
4	16.15	164	164	277	390	616	1,068	1,294	
12	9.59	464	464	532	600	736	1,007	1,144	
20	3.23	640	640	663	686	732	(824)	(870)	
16	1.62	848	848	859	870	892	936	958	

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effluent charge can be set so as to induce the necessary reduction in effluent from the mill, providing that a technically feasible system of pollution control can secure the required improvement in the effluent. For example, there exists a dissolved oxygen sag over the 32 miles of the Spanish River below the Eddy mill at Espanola (see Table IV 3). If the Ministry's requirement of a reduction in BOD_5 loading to 5 tons/day was met it would eliminate the dissolved oxygen sag and the water would be compatible for normal uses (although some fish tainting would remain). To achieve this level of BOD_5 by means of an effluent charge, Table VI 7 shows that the charge would have to be set at 8 cents/lb. BOD_5 . This would induce the company to minimize its costs by installing pollution control programme number 146, which, at 5.53 tons BOD_5 /day, comes reasonably close to the Ministry requirement. (A charge of at least 15 cents/lb. BOD_5 would be necessary to induce the firm to select pollution control programme number 205 over 146).

There is also a marked dissolved oxygen sag for 25 miles below the Abitibi mill at Iroquois Falls. A reduction to 7.5 tons/day of BOD_5 discharged, as required by the Ministry, would eliminate this sag and there would be an immediate improvement in the water quality, despite the

continued existence of the suspended solids accumulation. Table VI 7, however, shows that none of the pollution control programmes considered feasible for this mill can reduce BOD_5 to 7.5 tons/day, although two of the programmes, numbers 20 and 16, can more than meet this objective. An effluent charge at 8 cents/lb. BOD_5 would imply cost minimization by the selection of programme 20, which is also the cost minimization programme for an effluent charge of 5 cents/lb. BOD_5 . (An effluent charge of 18 cents/lb. BOD_5 would be needed to make programme 16 less expensive for the company than all other programmes).

b. Cost to the Company

The cost to the company of an effluent charge includes the cost of the pollution control which the company is induced to install so as to reduce its liability for the effluent charge, and the payment of the charge on the residual effluent.

As explained in the previous section, the likely response of a company to an effluent charge depends on the technically feasible pollution control options open to the company, their cost, the rate of the effluent charge and the characteristics of the effluent that are assessed for the charge. The importance of these factors is shown

very clearly in the analysis of the Eddy mill at Espanola and the Abitibi mill at Iroquois Falls.

Table VI 7 showed how the least cost, technologically feasible, pollution control programme for each mill varied with the rate of the charge levied on the BOD₅ content of the mills effluents.

The costs in Table VI 7 were based on a specified set of tax provisions (i.e. accelerated depreciation allowed on the capital costs of pollution control, except for the installation of oxygen bleaching and chemical recovery, which are assumed to be subject only to normal depreciation). In Table VI 8, which is in four parts, three additional taxation possibilities are allowed for:

- the company has no taxable income over the life of the equipment (Case 2) (i.e. the company cannot take advantage of the depreciation allowances).
- only normal depreciation of the equipment is allowed (Case 3)
- all capital expenditures on pollution control, including oxygen bleaching and chemical recovery, may be written-off over 2 years (Case 1).

TABLE VI 8 i

LEAST COST PROGRAMS FOR POLLUTION CONTROL AT TWO MILLS
WITH AN EFFLUENT CHARGE AND NO TAXABLE INCOME (CASE 2)

EDDY FOREST PRODUCTS, ESPANOLA

1	2	3	4	5	6
Effluent Charge Cents/lb BOD ₅	Least Cost Program (Alternative Number)	BOD ₅ (Tons/Day)	Pollution Control (Equivalent Annual Cost \$000)	Payment of Charge Annual Cost \$000)	Total (4+5)
0	11	22.91	-605	0	-605
1	11	22.91	-605	160	-445
2	11	22.91	-605	320	-285
4	76	10.98	-296	320	24
8	68	10.11	-258	566	308
10	68	10.11	-258	708	460

ABITIBI, IROQUOIS FALLS

0	1	62.00	0	0	0
1	1	62.00	0	434	434
2	1	62.00	0	868	868
4	3	17.00	893	476	1369
8	3	17.00	893	952	1845
10	3	17.00	893	1190	2083

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TABLE VI 8ii

LEAST COST PROGRAMS FOR POLLUTION CONTROL AT TWO MILLS
WITH AN EFFLUENT CHARGE AND PARTIAL ACCELERATED DEPRECIATION (CASE 1*)

EDDY FOREST PRODUCTS, ESPANOLA

1 Effluent Charge Cents/lb BOD ₅	12 Least Cost Program (Alternative Numbers)	13 BOD ₅ (Tons/Day)	14 Pollution Control (Equivalent Annual Cost \$000)	15 Payment of Charge Annual Cost \$000)	16 Total (16+15)
0	11	22.91	-478	0	-478
1	12	16.41	-453	115	-338
2	68	10.11	-387	142	-246
4	68	10.11	-387	284	-103
8	146	5.53	-144	310.	166
10	146	5.53	-144	387	243

ABITIBI, IROQUOIS FALLS

0	1	62.00	0	0	0
1	3	17.00	134	119	253
2	3	17.00	134	238	372
4	3	17.00	136	476	610
8	20	3.23	640	181	821
10	20	3.23	640	226	866

TABLE VI 8.iii

LEAST COST PROGRAMS FOR POLLUTION CONTROL AT TWO MILLS
WITH AN EFFLUENT CHARGE AND PARTIAL ACCELERATED (CASE 1)
DEPRECIATION

EDDY FOREST PRODUCTS, ESPANOLA

1 Effluent Charge Cents/lb BOD ₅	12 Least Cost Program (Alternative Numbers)	13 BOD ₅ (Tons/Day)	14 Pollution Control (Equivalent Annual Cost \$000)	15 Payment of Charge Annual Cost \$000)	16 Total (16+15)
0	11	22.91	-478	0	-478
1	12	16.41	-453	115	-338
2	68	10.11	-387	142	-246
4	68	10.11	-387	284	-103
8	146	5.53	-144	310	166
10	146	5.53	-144	387	243

ABITIBI, IROQUOIS FALLS

0	1	62.00	0	0	0
1	3	17.00	134	119	253
2	3	17.00	134	238	372
4	3	17.00	136	476	610
8	20	3.23	640	181	821
10	20	3.23	640	226	866

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TABLE VI 8 iv

LEAST COST PROGRAMS FOR POLLUTION CONTROL AT TWO MILLS
WITH AN EFFLUENT CHARGE AND FULL ACCELERATED DEPRECIATION (CASE 1)

EDDY FOREST PRODUCTS, ESPANOLA

1	17	18	19	20	21
Effluent Charge Cents/lb BOD ₅	Least Cost Program (Alternative Number)	BOD ₅ (Tons/Day)	Pollution Control (Equivalent Annual Cost \$000)	Payment of Charge	Total (19+20)
0	11	22.91	-565	0	-565
1	12	16.41	-540	115	-425
2	68	10.11	-473	142	-331
4	68	10.11	-473	284	-189
8	146	5.53	-231	310	79
10	146	5.53	-231	387	156

ABITIBI, IROQUOIS FALLS

0	3	17.00	- 30	0	- 30
1	3	17.00	- 30	119	89
2	3	17.00	- 30	238	208
4	3	17.00	- 30	476	446
8	20	3.23	486	181	657
10	20	3.23	486	226	712

The table shows, for each of the four configurations of taxes, the costs to the companies of various rates of an effluent charge on BOD_5 . These costs are based on the assumption that, in response to the taxes and effluent charge, the companies adopt the programme of pollution control which will minimize their combined costs of pollution control and payment of the effluent charge.

Table VI 8 reveals several interesting points about the ways in which taxation and an effluent charge combine to affect the decisions a company may make concerning pollution control.

Reading across the four parts of the table one can see, for each rate of effluent charge in column 1 and each of the four tax situations:

- (1) the least cost pollution control programme at each mill (columns 2, 7, 12, 17,)
- (2) the resulting BOD_5 loading (columns 3, 8, 13, 18)
- (3) the equivalent annual cost to the companies of installing, operating and maintaining the equipment (columns 4, 9, 15, 21)
- (4) the annual cost to the companies of paying the effluent charge (columns 5, 10, 15, 29) assuming each mill operates for 350 days per year
- (5) the combined annual cost of the pollution control programme

and the payment of the effluent charge (columns 6, 11, 16, 21)

The results are displayed, from left to right in ascending order of the taxable allowances available to the companies. This makes it possible to assess the different extent to which these allowances relieve the companies of the costs involved in pollution control, with and without an effluent charge.

To facilitate interpretation of Table VI 8 it is helpful to begin by taking each mill separately. Then, for each mill, it is useful to examine the effect of the various depreciation allowances holding the effluent charge constant, and the effect of the different rates of the effluent charge, holding the depreciation allowance constant. To do the former it is necessary to read the table across the rows, and to do the latter, one must read down the columns of the table, one part at a time.

The first row of Table VI 8 shows the costs to Eddy Forest Products of the least cost pollution control alternative under increasingly generous systems of depreciation allowances, with a zero effluent charge. It is striking that the Eddy mill seems to be best favoured by having no taxable income (which is equivalent to being unable to take advantage of

depreciation allowances). With no effluent charge the least cost option available to the company under the four tax situations involves the company in annual costs ranging from - \$605,000 to - \$478,000. The minus sign indicates a negative cost which is the same as a profit. This is because the installation of oxygen bleaching at the mill would be a profitable way of reducing the mill's BOD₅ loading. In these circumstances the assumption that the mill has no taxable income over the life of the equipment means that it is not subject to profits tax even though its costs decline when oxygen bleaching is installed. Thus, even though the company cannot utilize the depreciation allowances since its taxable income is assumed to be zero, (which requires the assumption that some other factor just balances out the cost reduction due to oxygen bleaching), this disadvantage is more than outweighed by the fact that the company does not incur an increase in its payment of profits tax as a result of the decline in costs.

In the other three tax situations the result is as expected. The more favourable depreciation allowances of Case 1 over Case 1* and Case 1* over Case 3 do favour the company. Indeed with an effluent charge of 2 cent/lb BOD₅,

the cost to the company of its least cost option is less when full accelerated depreciation prevails (column 21) than when the firm has no taxable income (column 6). It is no longer the case that the exemption from the profits tax outweighs the advantages of the full accelerated depreciation, though it continues to outweigh the gains from the other systems of depreciation.

In terms of the degree of effluent control that the company is induced to install, assuming all the time that the company seeks to minimize its costs, it is apparent that, for any rate of effluent charge, the company tends to reduce its BOD_5 loading as the depreciation provisions become more generous. Thus, at an effluent charge of 2 cents/lb. BOD_5 , the least cost option for the mill involves a BOD_5 discharge of 22.91 tons per day when it has no taxable income, and therefore no depreciation allowance, and a BOD_5 discharge of 10.11 tons per day when it can use either partial or full accelerated depreciation. In these last two cases, the provision of full accelerated depreciation rather than partial accelerated depreciation does not induce any more pollution control, but it does relieve the company of costs whose equivalent annual value is \$86,000/year.

For each of the four systems of depreciation allowances an increasing rate of effluent charge tends to encourage a greater degree of pollution control. This is seen by reading down columns 3, 8, 13, and 18.

When the interaction of the depreciation allowances and the different rates of effluent charge is considered, raising the rate of effluent charge tends to be more effective in reducing effluent the more favourable are the depreciation allowances. This is because the depreciation allowances make the cost to the firm of additional pollution control less expensive than it would otherwise be. The expenditure required to reduce the BOD_5 loadings of the mill are more likely to be less than the increased cost of paying an effluent charge if the rate of charge is increased, the smaller is the share of the cost of pollution control that is borne by the mill.

The least cost options available to the Abitibi mill, which are detailed in Table VI 8, reflect an overall pattern very similar to the options already discussed for the Eddy mill. The absence, however, of any really profitable way of reducing pollution at this mill means that for any particular combination of effluent charge and depreciation allowance, Abitibi must incur far greater costs than Eddy Forest Products. (The installation of a chemical recovery

plant does show a small profit if full accelerated depreciation prevails). Compare, for example, the least cost alternatives for each mill when partial accelerated depreciation is allowed and an effluent charge of 2 cents/lb. BOD₅ is imposed. The Eddy mill can reduce its annual operating costs by \$387,000 per year and pay \$142,000 per year in effluent charges, giving an annual net gain to the mill of \$246,000. This gain is due, of course, to the profitability of installing oxygen bleaching which constitutes a part of pollution control programme number 68. The Abitibi mill has no such profitable possibility and so the same rate of effluent charge and depreciation allowance involves an annual cost to the mill of \$372,000 made up of \$134,000 in pollution control costs and \$238,000 in effluent charges.

c. Cost to the Provincial and Federal Governments

The cost of an effluent charge to the two senior levels of government depends on how the revenues from the effluent charge are shared between them, and on the nature of the depreciation allowances that are permitted. For the purposes of this discussion it is assumed that the Provincial Government imposes the effluent charge.

In order to estimate the cost to government of particular combinations of effluent charge rates and favourable

depreciation allowances, it is necessary to take account of the change in pollution control programme that these policies may induce. For example, Table VI 8 (iii) indicates that programme number 12 is the least cost option for the Eddy mill if an effluent charge of 1 cent/lb BOD₅ is imposed and partial accelerated depreciation is allowed. If only normal depreciation is allowed and the same effluent charge prevails, then the least cost pollution control programme for the mill changes to number 11. Therefore, estimation of the cost of government of an effluent charge of 1 cent/lb BOD₅ and partial accelerated depreciation allowances must be based on the difference in the costs to government that are associated with the change in the companies' pollution control programmes brought about by the selection of the policy.

The costs to the provincial government of different rates of effluent charge in conjunction with various forms of depreciation allowances may be approached in two ways:

(1) The net change in the governments' fiscal position can be estimated. To do this account must be taken of the revenue from the effluent charge and the tax revenue foregone as a result of the companies' expenditure on pollution control.

(2) The change in government revenue from the special

provisions for pollution and its control may be estimated. This approach begins from the existence of normal depreciation and only accounts for revenue foregone, because of accelerated depreciation allowed on pollution control equipment. This revenue foregone is added to the sales tax refund and the revenue from the effluent charge to arrive at the net cost to government of the combined programme.

Table VI 9 displays data that permits both formulations of cost estimates for the Abitibi mill at Iroquois Falls. The relevant totals for each formulation are listed as totals a and b for the provincial and federal governments, respectively. The decline in Corporation tax revenues is allocated 32% to the provincial government and 68% to the federal government. The only systematic relations between the various combinations of effluent charge and depreciation allowances that is revealed in Table VI 9 is that which shows that the costs to both levels of government as measured by totals a and b, become greater through sections VI 9 i , VI 9 ii , and VI 9 iii . This simply shows the extent to which more favourable depreciation allowances shift the expense of pollution control from the company to the government.

TABLE VI 9 i

COSTS TO GOVERNMENT OF POLLUTION CONTROL AT ABITIBI, IROQUOIS FALLS
WITH AN EFFLUENT CHARGE AND NORMAL DEPRECIATION (EQUIVALENT ANNUAL COST \$000)

1 Effluent Charge (Cents/lb. BOD ₅)	2 Decline in Corporation Tax	3 Sales Tax Refund	4 Effluent Charge Revenue	5 Provincial		6 Total		7 Federal		8 Total
				a	b	a	b	a	b	
0	0	0	0	0	0	0	0	0	0	0
1	760	98	-119	124	-21	517	0	517	0	0
2	760	98	-238	5	-140	517	0	517	0	0
4	760	98	-476	-233	-378	517	0	517	0	0
8	1,702	159	-181	364	-22	1,157	0	1,157	0	0
10	1,702	159	-226	319	-67	1,157	0	1,157	0	0

- 373 -

Total a shows the net change in the Provincial and Federal Governments' fiscal position

Total b shows the cost to the Government of the special provisions for pollution and pollution control.

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TABLE VI 9 ii

COSTS TO GOVERNMENT OF POLLUTION CONTROL AT ABITIBI, IROQUOIS FALLS
WITH AN EFFLUENT CHARGE AND PARTIAL ACCELERATED DEPRECIATION (EQUIVALENT ANNUAL COST (\$000))

1	9	10	11	12	13	14	15
Effluent Charge (Cents lb/BOD ₅)	Decline in Corporation Tax	Sales Tax Refund	Effluent Charge Revenue	Total a	Provincial Total b	Federal Total a	Federal Total b
0	0	0	0	0	0	0	0
1	760	98	-119	124	-21	517	0
2	760	98	-238	5	-140	517	0
4	760	98	-476	-233	-378	517	0
8	1,796	159	-181	393	-22	1,221	94
10	1,796	159	-226	348	-67	1,221	94

- 374 -

Total a shows the net change in the Provincial and Federal Governments' fiscal position

Total b shows the cost to the Government of the special provisions for pollution and pollution control.

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TABLE VI 9 iii

COSTS TO GOVERNMENT OF POLLUTION CONTROL AT ABITIBI, IROQUOIS FALLS
WITH AN EFFLUENT CHARGE AND FULL ACCELERATED DEPRECIATION (EQUIVALENT ANNUAL COST \$000)

Costs to Government of Pollution Control at Abitibi, Iroquois Falls
with an Effluent Charge and Full Accelerated Depreciation (Equivalent Annual Cost \$000)

1 Effluent Charge (Cents /lb BOD ₅)	16 Decline in Corporation Tax	17 Sales Tax Refund	18 Effluent Charge Revenue	19 Provincial Total		20 Total		21 Federal Total		22 Total
				a	b	a	b	a	b	
0	922	98	0	295	52	627		627		110
1	922	98	-119	176	-67	627		627		110
2	922	98	-238	57	-186	627		627		110
4	922	98	-476	-181	-424	627		627		110
8	1,959	159	-181	446	-99	1,332		1,332		175
10	1,959	159	-226	401	-144	1,332		1,332		175

- 375 -

Total a shows the net change in the Provincial and Federal Governments' fiscal position

Total b shows the cost to the Government of the special provisions for pollution and pollution control.

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It is striking that even with full accelerated depreciation, the provincial government's fiscal position improves significantly if an effluent charge of 4 cents/lb BOD₅ is selected. The provincial government would receive \$181,000 annually if the charge was imposed and full accelerated depreciation was allowed. This is a gain of more than \$200,000 over the other rates of charge. (The reason being that the revenue from the effluent charge is comparatively great even though it fails to induce any more pollution control than a zero rate of charge.)

These figures illustrate the danger that some critics of effluent charges have pointed out. The scheme could become such a potent source of government revenue that it might evolve into an instrument for fund raising rather than for pollution control. The results of the analysis that are displayed in Table VI 9 show that this criticism need not be without foundation.

d. Economic and Social Effects on the Area Surrounding the Mills

The really fundamental issue with respect to the local repercussions of any pollution control policy is whether the implementation of a policy will lead a mill to close. The most obvious indication of whether a mill will remain

viable after the implementation of an effluent charge policy is the expected future profits of the mill, net of all the mill's expenses incurred because of the pollution control policy. Only if this net profit is expected to be positive will the mill remain in operation and even then, the net profit must be sufficient to justify the use of the capital that is tied up in the mill. If the capital could earn a bigger profit elsewhere, possibly because of more lenient pollution control requirements in other regions, then the mill may close down in response to a pollution control policy that is especially costly to the company concerned.

Section F-4 in Chapter III contains estimates of the revenues, costs and profits for 1971 of each of the mills in Ontario. As rough as these estimates are, they do show that in 1971, which is widely regarded as a bad year for the industry, many of the mills made very substantial profits. These include the Eddy mill at Espanola and the Abitibi mill at Iroquois Falls.

However, the ability of these two mills to bear the burden of an increase in their costs due to an effluent charge, is not the same. This is because, as columns 16 and 21 of Table VI 8 show, the costs to the mills of various rates of effluent charges are very different. Whereas

\$460,000 is the maximum increase in Eddy's annual costs under partial or accelerated depreciation for any effluent charge up to 10 cents/lb. BOD_5 the Abitibi mill will incur annual costs well in excess of this for an effluent charge of 4 cents/lb BOD_5 with partial accelerated depreciation and 8 cents/lb BOD_5 with full accelerated depreciation.

This very substantial difference in the costs to be incurred by the various mills in Ontario as a result of an effluent charge may very well limit the size of the effluent charge, if all mills are to be subjected to the same charge. Although only two mills have been examined at all closely, it is reasonable to suppose that an effluent charge of only 1 cent/lb BOD_5 could impose a serious financial strain on those mills which are only marginally viable. If the closure of such mills is to be prevented then an effluent charge, if it is to be considered at all, would have to be set at 1 cent/lb BOD_5 or less, assuming that each mill is to be subjected to the same charge.

There are, however, some important variations in the design of an effluent charge system that can be used to achieve the level of pollution control brought about by a higher rate of effluent charge, without placing an undue

financial burden on those mills which are barely viable.

In section 4 of this Chapter, a particular formulation of an effluent charge is proposed which would provide a significant economic incentive for mills to install pollution controls without threatening the viability of the mills to the same extent as the charge scheme that has been examined here.

e. Equity

Depending on the chosen criterion of equity, an effluent charge may seem very inequitable or very equitable. Quite clearly, an effluent charge that is uniform among all mills does not impose the same costs on each mill, either in terms of the payment of the charge or the costs to the mills of installing equipment to avoid the charge. On the other hand, the imposition of an effluent charge at the same rate for each mill would mean that all mills face the same price for discharging effluent, in the same way as they face similar prices for all the other inputs that their mill operations require. Indeed, differences in the prices of inputs are often a source of complaint by businessmen who object when their competitors can obtain inputs at lower prices. This is particularly the case when these are prices for inputs over which the government has some control such as power costs and freight rates. By the same token,

therefore, a uniform effluent charge among mills could be regarded as an equitable arrangement.

One problem with this, however, is that the actual choice of the characteristics of the effluent which are to be included in the effluent charge, and the relative weighting of these characteristics, will favour some mills as against others. Furthermore, mills may argue that the damage done by their effluent discharge may be less than that for other mills, measured on a pound for pound basis. An effluent charge based on damage would overcome this objection though as noted previously such a basis for an effluent charge is not a practical possibility. Consequently, on grounds of equity alone it may be necessary to supplement an effluent charge with other policy instruments so that the comparatively favourable treatment of some mills, merely because of the nature of the effluent charge, is compensated by the use of these other policies.

The effluent charge that was examined in the context of the Eddy mill and Abitibi mill, was supplemented by various forms of depreciation allowances. These too can be assessed in terms of equity and it is apparent that they do not benefit all mills equally. First of all

accelerated depreciation only aids those mills which are making profits. Moreover, accelerated depreciation only serves to reduce the capital costs of pollution control and not operating and maintenance costs. Since mills have different pollution control options available, those which can make greater use of capital intensive options as opposed to labour intensive options will receive greater government assistance than those mills which have better labour intensive options.

Any serious attempt by the government to deal with the problem of water pollution in Ontario is bound to involve the pulp and paper industry more than any other. This is because the pulp and paper industry is responsible for such a large proportion of the water borne wastes discharged in the Province. Consequently, an effluent charge applied to all industries which discharge wastes, and possibly to municipalities too, would be likely to penalize the pulp and paper industry more than any other. To apply an effluent charge only to the pulp and paper industry would accentuate this difference and might very well be regarded by the industry as unfair.

The crucial factor, as far as the industry is concerned, is the costs it must incur as a result of this or any other pollution control policy. Effluent charges cannot be ruled out on these grounds alone since the costs to the industry,

and to the companies which compose it, vary tremendously with the rate of the effluent charge, and the availability of favourable depreciation allowances. Therefore, the question of equity and effluent charges can only be assessed in terms of a particular programme. Such a programme may go beyond that which has been considered so far in this study, to include capital grants and other such means of lessening the costs to the industry. Only when it is cast in these specific terms is there any hope of coping with the complex issue of equity.

f. Administration

The difficulties in administering an effluent charge depend on the nature of the effluent charge. In Table VI 6 four bases for an effluent charge were considered in terms of the purposes they could serve. The administration of these four forms of effluent charge becomes progressively more difficult and costly as the base of the charge is expanded from the quantity of the effluent to the damage caused by the effluent.

The key factor is the ease with which the effluent can be monitored for purposes of the charge. A system which relies on the mills to monitor their own effluent, with spot checks by the Ministry, would seem the most practical method and would not be inconsistent with the

Ministry's existing policy nor the standard means of assessing and collecting corporation taxes. Since the mills already submit monthly effluent data to the Ministry, including data on hourly flows, daily BOD₅ and suspended solids, and several other measures as specified by the Ministry, these data could be used for charging purposes. This would require a change in the legal status of the data, which are only supplied on a voluntary basis at the moment, and there would have to be serious penalties imposed for deliberately falsifying the reports.

These penalties would be unlikely to eliminate all such falsification, since the incentive to cheat could be quite high with only a moderate effluent charge. Nevertheless, as in so many other areas of government regulation, some reliance must be placed on the integrity of the professionals involved in gathering the necessary data. Furthermore, the use of automatic monitoring equipment would increase the reliability of the data.

Under these circumstances, an effluent charge which is introduced to complement the existing Ministry policies for pollution control seems to be a practical policy instrument worthy of further consideration. To this end,

Section E contains a discussion of two effluent charge schemes which are specifically designed to overcome some possible objections to the schemes examined in this section.

D. DIRECT FINANCIAL ASSISTANCE PROGRAMMES

1. General Description

In the previous sections considerable attention was paid to the effects of different forms of depreciation allowances, and especially the extent to which these allowances reduce the costs of pollution control to companies. Depreciation allowances may be regarded as indirect forms of financial assistance since they work by reducing the taxes paid by the company, but are not a direct reduction in pollution control costs.

In this section ~~several~~ forms of direct financial assistance are considered. These range from completely repayable loans at competitive rates of interest to outright grants. The effects, costs and administration of any particular financial assistance programme depends on the extent to which it is a mix of a loan and a grant. Because of the wide variety of direct financial assistance programmes it is not feasible to analyse these programmes with the categories used in

previous sections and so the discussion will be kept at a more general level. Although no particular financial assistance programme will be examined in detail, the section will have relevance to a broad range of such programmes.

2. Assessment

a. Financial Assistance As a Stimulus to Pollution Control

Financial assistance will only lead to more pollution control by companies if the assistance overcomes the particular obstacle that is preventing the company from taking action. For example, if a company resists any expenditure on pollution control which is not profitable, then nothing less than a grant for 100% of the costs of pollution control will induce the company to act.

At the other extreme, there may be a company which is perfectly willing to incur the costs of pollution control but is unable to raise the necessary funds from private sources. In this case a loan from the government at competitive interest rates will be sufficient to bring about the pollution control.

In between these two extreme cases there are several important possibilities. If a company is being subjected to pressure from the Ministry to install pollution control

equipment, then the offer of some sort of grant might be sufficient to obtain the company's compliance with the Ministry's requirements. Such a grant might be a loan at a subsidized interest rate or the provision of non-repayable funds to offset part of the costs for pollution control. It remains true, however, that the profit orientated company is unlikely to respond to this form of partial subsidy unless the government is also coercing the company by other means, such as the threat of legal action or a direct economic incentive.

One problem with loans, whether or not they are at reduced interest rates, is that companies may be concerned about their ratio of debt to equity, and will not want this upset by taking on an additional loan. The reason for this is that the more debt a company has in relation to its equity, the larger are the payments of interest to which it is committed. This can prove dangerous for a company, particularly in an industry like pulp and paper, which is accustomed to a succession of good and bad years. In the bad years when profits are low the company still has to meet its debt obligations and this may impose an untenable burden on the company.

This concern of companies with debt equity ratios may weaken the effectiveness of a loan programme. It is possible, however, to construct a loan programme which overcomes this problem. All that is necessary is that the repayment of the loan including the interest, be geared to the profits of the company. Consequently, the financial burden placed on a company accepting such a loan would vary from year to year in step with the company's profits. In lean years the company would have an obligation to repay a smaller portion of the loan than in years which were more profitable. Such an arrangement would amount to a loan which is refinanced to suit a company's changing circumstances. It might even be possible to establish the loans on a mill by mill basis. It is unlikely, however, that this would appeal to companies which own several mills since they would lose the option of allocating funds from one mill to another in order to qualify for the refinancing of their loans under the scheme.

The kind of loan being discussed here would make the loan of a specific amount more acceptable to a company. It would also go some way towards taking account of a company's cash flow situation. This factor was not emphasized in the earlier sections of this report because it is difficult

to treat it in a systematic fashion without the necessary detailed information for each company. The problem is that the costs of pollution control are not spread evenly over the life of the equipment but tend to be concentrated primarily in the first year when the capital equipment is installed. Consequently, a company may not have the available funds at the appropriate time to finance the expenditure. One way of resolving this difficulty is for the company to take out a loan and by this means to convert the temporally uneven requirement for funds to an equal annual payment over many years. (The device used throughout of converting the costs of pollution control into a stream of equivalent annual payments may be interpreted as the repayments on a loan sufficient to cover the pollution control costs to the company using a 15% interest rate).

b. Financial Assistance and the Kind of Pollution Control

The analysis of the pollution control options available for the Eddy mill at Espanola and the Abitibi mill at Iroquois Falls showed that some options were considerably more capital intensive than others. This is the primary reason why the depreciation allowances reduced the costs to the companies of some pollution control programmes by a greater

percentage than others, since depreciation allowances only affect the costs to the company of the capital equipment and not the operating and maintenance costs. By the same token the provision of direct financial assistance can lead to a company choosing one pollution control programme rather than another merely because of a difference in their capital intensity. For example, if the government were to give grants or tax credits to mills which installed new pollution control equipment but did nothing to reduce the costs to the mill of maintaining and operating the equipment, then the mill's choice of a pollution control programme will tend to be biased in favour of capital intensive programmes. Not only could this lead to the choice of a programme that is more costly in total, with a greater burden on the government, than is otherwise necessary, but it would create fewer jobs than would be available in a more labour intensive system of pollution control.

This problem, which currently exists in connection with the accelerated depreciation allowances, can be avoided by direct or indirect assistance which treats all pollution control expenses equally. Reduced interest rates on government loans for pollution control would be preferable on these grounds, to capital grants.

Accelerated depreciation, if it is to be retained, could be modified to avoid the bias it gives to capital intensive pollution control programmes. One way of doing this would be to stipulate that the sum eligible for accelerated depreciation would be some portion of the capital costs of pollution control, say 80%, plus the average annual operating and maintenance costs of the equipment. This would mean that capital intensive programmes would be penalized relative to labour intensive programmes in that average annual operating and maintenance costs are higher the more labour intensive is the pollution control programme.

c. The Administration of Direct Financial Assistance Programmes

The administration of direct financial assistance requires that some criterion of eligibility be established. One of the problems with this is that financial assistance programmes which are the easiest to administer tend to be the least effective in achieving the desired goal, which, in this case is more effective pollution control. For example, the Ministry of the Environment might pay for a fixed percentage of the costs of installing pollution control equipment, or what amounts to the same thing,

give a tax credit related to pollution control expenditures. (The refund of sales tax on pollution control equipment is this form of assistance.) Those companies which are reluctant to spend any money on pollution control which does not show a cash return will still find pollution control an unattractive form of expenditure. Other companies which were going to install equipment in any case will obviously welcome the financial assistance, but it will not lead to any extra pollution control. It is only the companies which are legitimately short of funds and which would otherwise install equipment, that would respond favourably to this form of financial assistance.

The same argument can be made about government loans at reduced rates of interest. This does not make pollution control profitable and so will not induce action by unco-operative companies. And of those companies which take advantage of the loans, some would have put in pollution control anyway.

A more effective way of administering a financial assistance programme than by this kind of across the board approach would be to attempt to make the funds available only to those companies which will respond by introducing

more pollution control than they would in the absence of the financial assistance. Such a policy might be made to work given the Ministry's knowledge about the companies which has been obtained in the administration of the current policy during the past few years. It would, of course, be unsound to rely on the companies' claims in this regard since no company will wish to disqualify itself from financial assistance by admitting that it would spend money on pollution control even without the assistance. The trouble with a programme such as this is that it allows a great deal of discretion to those who administer it. It may also be considered inequitable to provide funds to companies which have been unco-operative in the past, and to exclude those companies which have incurred expenses for pollution control or are willing to do so in the future.

Depending on the scale of programme envisaged, direct financial assistance of the kind considered in this section can be expensive for the government and yet be ineffective at the same time. Attempts to make it more effective may allow too much discretion and be inequitable. Nevertheless, direct financial assistance has an important advantage over indirect financial assistance: the government's share of the costs of pollution control in the industry is made clear instead of being hidden in the mysterious operations

of the tax system. For this reason alone, there is a good case for substituting direct for indirect financial assistance, at least on the part of the Provincial Government. In the next section this change in policy is considered as part of a suggested policy programme for pollution control in the pulp and paper industry.

E, A SUGGESTED POLICY PROGRAMME FOR CONTROLLING WATER POLLUTION
 FROM THE ONTARIO PULP AND PAPER INDUSTRY

1. General Description

In the previous sections of this chapter a wide range of policy instruments for pollution control have been examined. Many of the instruments which are currently in use or might be considered for adoption in the future were found to be deficient in some important respects. The purpose of this section is to present a policy programme which would avoid some of the more serious problems that have been mentioned. At the same time, however, the programme to be described is sufficiently similar to the existing provisions that its introduction would represent no more than an evolutionary change in policy.

The suggested policy programme consists of the following instruments:

- (1) Effluent objectives established by the Ministry of the Environment, based on ambient quality standards and alternative uses of the receiving water.
- (2) Fines, control orders and stop orders for regulating the discharge of all contaminants other than BOD₅ and suspended solids (SS). The discharge of BOD₅ and SS would also be subject to regulations by fines, control orders and stop orders in exceptional circumstances.
- (3) A pollution control delay penalty levied on mills which fail to reduce their discharges of BOD₅ and SS at a prescribed rate.
- (4) Refund of sales tax on pollution control equipment.
- (5) Either:
 - the existing system of accelerated depreciation for pollution control equipment,OR
 - modified accelerated depreciation to avoid the bias in favour of capital intensive methods of pollution control, e.g. the sum eligible for accelerated depreciation could be calculated as follows:

80% of the capital cost + average annual operating and maintenance costs.

(6) Either:

- Loans at market rates of interest with a fixed schedule of repayment.

OR

- Loans at market rates of interest with repayments geared to the financial circumstances of the mill.

The only instrument in this policy programme which has not been discussed so far is the pollution control delay penalty. This novel instrument will form the main subject of the remainder of this chapter.

2. Pollution Control Delay Penalties

The purpose of a pollution control delay penalty is to provide mills with an economic incentive to reduce their effluent at a steady rate until the Ministry's objective for the mill is achieved. The imposition of a delay penalty would be in contrast to the current policy which makes it advantageous for a mill to delay pollution control so as to postpone expenditures on unprofitable activities.

A pollution control delay penalty (PCDP) can be designed in several ways, but only two PCDP's (PCDP1 and PCDP2) will be examined here.* These are defined according to several characteristics:

...396

* A simpler formulation of a pollution control delay penalty is presented in the Summary and Update to this report.

a. PCDP1 and PCDP2 Defined

- (1) Effluent objectives would be set which could differ according to the location of the discharge.
- (2) The effluent objectives would be subject to revision at prescribed intervals.

PCDP1

- (3a) A charge would be levied on the annual discharge of BOD₅ and SS. (Other feasibly measurable contaminants could also be included if desired).
- (4a) A refund would be given to dischargers based on the reduction in effluent from some previous time period to the present one, e.g. one year to the next.

PCDP2

- (3b) A charge would be levied on the annual discharge of BOD₅ and SS, as a proportion of the amounts specified by the effluent objective.
- (4b) A refund would be given to dischargers based on the reduction in BOD₅ and SS, as a proportion of the amounts specified by the effluent objective from some previous time period to the present one, e.g. one year to the next.

PCDP1 and PCDP2

- (5) The charge rate and refund rate would be the same for all mills.

- (6) The charge rate and refund rate would be subject to revision at prescribed intervals.
- (7) The charge rate would not be less than the refund rate.
- (8) For any mill, the refund in any year could not exceed the payment of the charge for that year. Unpaid refunds could be carried forward.
- (9) Appropriate conditions would be imposed so that once a mill meets the effluent objective there would be no additional economic incentive for further reductions in effluent until the effluent objective is reviewed and raised.
- (10) Only those mills which exceed some specified quantity of discharge would be included in the scheme.

b. PCDP1 and PCDP2 Compared

The rationale for selecting these characteristics will become clear in the discussion which follows. It is sufficient to note that both schemes operate in a way that allows a mill to reduce its effluent discharge at a pre-determined rate over a period of years, so that what it pays for discharging effluent and what it receives for reducing its discharge just balances out. This means that a mill

which keeps to the appropriate schedule for pollution control is not penalized by either of the schemes and incurs only those costs directly associated with pollution control. A mill is only penalized if it fails to reduce its effluent discharge from one year to the next at a sufficient rate to qualify it for a refund large enough to make its net liability for that year equal to zero. It is for this reason that the schemes are designated pollution control delay penalties and, as such, are very distinct from the effluent charge schemes that were discussed in the previous section.

The key difference between the two PDCP schemes is the bases on which the charge and refund are calculated. PDCP1 employs the absolute discharge of effluent and the reduction in the discharge. PDCP2 employs the discharge of effluent and the reduction in the discharge relative to the amount permitted by the effluent objective. If all mills were subjected to the same effluent objectives, then there would be no difference between the two schemes.

The difference comes about when mills are subjected to different effluent objectives. For each mill, under either scheme, there is a quantity of effluent that it can discharge in a given year without being liable for a net payment. The essence of both schemes is that this "no charge" quantity declines through time until the effluent objective is achieved. Under PDCP1, if two mills exceed the "no charge" quantity

by the same amount then, irrespective of the fact that different effluent objectives apply to the mills, they will be subject to identical pollution control delay penalties. Under PCDP2, however, the two mills may exceed the "no charge" quantity by the same amount and yet the mill which is subject to the more stringent effluent objective will be liable for a greater pollution control delay penalty than the other mill which is required to meet a more lenient objective.

These points can be clarified with the use of some simple mathematics. Only one type of effluent is assumed. The refund is based on effluent reductions from one year to the next and the charge and refund rates do not change.

The following symbols are defined:

- N_t = pollution control delay penalty in year t (\$)
- P_t = payment by the mill for discharging effluent in year t (\$)
- R_t = refund received by the mill in year t (\$)
- p = the charge per unit of effluent discharged in year t (\$/lb)
- r = the refund per unit of effluent reduction from year $t-1$ to year t (\$/lb)
- b = a charge rate applied to the ratio of the effluent discharge to the effluent objective in year t (\$)

d = a refund rate applied to the ratio of the reduction in effluent discharged from year $t-1$ to year t , to the effluent objective (\$)

S = the effluent objective (lbs)

W_t = the effluent discharged in year t (lbs)

W_0 = the effluent discharged in the base period (lbs)
(i.e. the effluent discharge from which the first reductions are calculated).

The two pollution control delay penalty schemes may each be described by several statements:

PCDP1

$$N_t = P_t - R_t \quad 1.1$$

$$R_t \leq P_t \quad 2.1$$

$$r \leq p \quad 3.1$$

$$R_t \leq r(W_0 - W_t) - \sum_{t=1}^{t-1} R_t \quad 4.1$$

$$P_t = \begin{cases} 0 & \text{if } W_t \leq S \\ pW_t & \text{if } W_t > S \end{cases} \quad 5.1$$

PCDP2

$$N_t = P_t - R_t \quad 1.2$$

$$R_t \leq P_t \quad 2.2$$

$$d \leq b \quad 3.2$$

$$R_t \leq \frac{d}{S} (W_0 - W_t) - \sum_{t=1}^{t-1} R_t \quad 4.2$$

$$P_t = \begin{cases} 0 & \text{if } W_t = S \\ \frac{bW_t}{S} & \text{if } W_t > S \end{cases} \quad 5.2$$

Equations 1 define the pollution control delay penalty in year t as the difference between the payment for discharging effluent and the refund for having reduced the discharge.

Equations 2 stipulate that the pollution control delay penalty in year t must not be less than zero, i.e. the government never makes a positive net payment to a mill.

Equations 3 specify that the refund rate must not be greater than the charge rate. This would eliminate the possibility of a mill profiting by deliberately increasing its discharge in one year, and paying a penalty, only to more than recoup its costs in subsequent years by reducing its effluent and benefiting from the higher refund rate.

Equations 4 allow a refund not receivable in year t , by virtue of equations 2, to be carried forward for receipt in future years. In PCDP1 the refund is based on the absolute reduction in effluent discharged. In PCDP2 the refund is based on the ratio of the reduction in discharge to the effluent objective.

Equation 5 states that there is no penalty if the discharge in year t is less than or equal to the effluent objective for the mill, irrespective of whether the discharge is a reduction from the previous year. If the discharge exceeds the objective then in PCDP1, the payment for discharging is levied on all the effluent at a constant rate per unit of effluent.

In PCDP2 the payment for discharging is levied on the ratio of the effluent discharged to the objective for the mill, providing the ratio is greater than one. (Note that the payment for discharging is not the same as the pollution control delay penalty, but is only one of its constituent parts).

Using these equations it is possible to calculate the rate at which a mill must reduce its effluent each year so that it can avoid liability for the pollution control delay penalty. In the first year of PCDP1, with $W_0 > S$:

$$N_1 = pW_1 - r(W_0 - W_1) \quad 6$$

By rearrangement of 6:

$$N_1 = p + rW_1 - rW_0 \quad 7$$

$$r = zp \quad 8$$

where $z \leq 1$ by virtue of equation 3.1

Substituting 8 into 7 and rearranging:

$$N_1 = p\{(1+z)W_1 - zW_0\} \quad 9$$

For $N_1 = 0$

$$p\{(1+z)W_1 - zW_0\} = 0 \quad 10$$

$$\text{i.e. } W_1 = \frac{z}{1+z} W_0 \quad 11$$

$$\text{In general terms, } W_t = \frac{z}{1+z} W_t - 1 \quad 12$$

Since $z \leq 1$ it follows that:

$$W_1 \leq \frac{1}{2} W_0 \quad 13$$

In the case where $p = r$, equation 12 says that the pollution control delay penalty for a mill will be zero in each and every year providing its effluent in each year is 50% of what it was in the previous year. If this rate of effluent reduction is judged too rapid for a mill to achieve at reasonable expense then the scheme may be easily modified to allow for a zero pollution control delay penalty with a slower rate of effluent reduction.

In the first year of PCDP2, with $W_0 > S$:

$$N_1 = b \frac{W_1}{S} - d \left(\frac{W_0}{S} - \frac{W_1}{S} \right) \quad 14$$

By setting $d = yb$ (where $y \leq 1$ by virtue of equation 3.2) and rearranging 14:

$$N_1 = \frac{b}{S} \{ (1+y) W_1 - y W_0 \} \quad 15$$

For $N_1 = 0$

$$W_1 = \frac{y}{1+y} W_0 \quad 16$$

Equation 16 is precisely equivalent to equation 11.

The difference between the two schemes is brought out most clearly by comparing equations 10 and 15. For simplicity z and y are assumed to be equal to 1. Equations 10 and 15 may then be written as equations 17 and 18 respectively.

$$\text{In PCDP1, } N_1 = p \{2W_1 - W_0\} \quad 17$$

$$\text{In PCDP2, } N_1 = \frac{b}{S} \{2W_1 - W_0\} \quad 18$$

It is obvious that if $p = \frac{b}{S}$ the two schemes are identical.

However, it was stipulated earlier that whereas p and b would be the same for all mills, S , the effluent objective, could differ among mills.

In the case of PCDP1 a mill's effluent objective does not affect the value of the pollution control delay penalty that it can incur. With PCDP2, however, the value of the pollution control delay penalty does depend on the mill's effluent objective. Other things equal, PCDP2 is greater the more stringent is the effluent objective that is imposed on a mill.

This feature of PCDP2 may be regarded as attractive in itself. If the effluent objective that is applied to a particular mill is relatively strict then this should reflect the degree of environmental damage that results in a failure to meet the objective. Since the costs of pollution control are normally positively related to the degree of pollution control that is to be achieved, a mill which is required to meet a stringent effluent objective may very well require a stronger economic incentive not to delay the necessary

expenditures on pollution control than a mill which has a less stringent objective to meet. This difference in incentives, is automatically built into PCDP2 even though the charge and refund rates are the same for all mills. With PCDP1, however, it is only possible to achieve differential pollution control dealy penalties among mills by subjecting them to different rates of charge and refund. Not only may different rates of charges and refund be considered inequitable by the industry, it would impose an unwelcome administrative burden on the agency that is responsible for setting the charges.

The advantage of PCDP2 over PCDP1 is that the benefits of varying the pollution control delay penalty to fit the circumstances of each mill can be obtained by adjustments in the effluent objectives that are applied to the mills. In Ontario the guidelines and objectives that the Ministry of the Environment has established in the past have always been subject to review and revision by the Ministry. Consequently, the use of a system of adjustable effluent objectives is perfectly consistent with the past policies and practice of the Ministry.

3. Assessment

At the beginning of section E, it was stated that the pollution control delay penalty is only one instrument among

several which constitute the suggested policy program. It is necessary, therefore, to consider explicitly the program in its entirety and to assess it in terms of the criteria which were used earlier in the chapter. There is, of course, no point in repeating the comments, criticisms and analyses that have already been made about many of the policy instruments that are included in this program, and so continual reference will be made to earlier sections of the chapter so as to avoid unnecessary repetition.

a. Environmental Effects

The environmental effects of this policy program are the same as those that would be achieved if the Ministry's current policy was effectively imposed. (See chapter IV). By penalizing delays in installing pollution control and by the provision of loans and accelerated depreciation, the government will induce the industry to approach and eventually adopt the degree of pollution control that is currently embodied in the established guidelines and objectives.

In the process of achieving the prescribed effluent objectives, it may be deemed desirable to revise the objectives, particularly if PCDP2 is used and more effective penalties are required to insure action by uncooperative mills. The point remains, however, that the suggested policy program will provide markedly increased incentives for action over the existing situation such that the environmental goals of the Ministry, which have been all too often frustrated by the inactivity of the pulp and paper industry, may very well be

achieved within the space of a few years.

b. Cost to the Company

As explained in detail in previous sections, the cost to companies of pollution control depends crucially on the fiscal situation of the company. It has already been shown that accelerated depreciation can make a substantial contribution towards shifting the costs of pollution control from companies to the Government. At present, the system of accelerated depreciation favours capital intensive methods of pollution control and it is for this reason that a modified form of accelerated depreciation is suggested on page 389. This would be a clear improvement on the existing system. It might be preferable, however, to replace accelerated depreciation with tax credits for pollution control, as discussed in section IV. However, the importance of adopting new policies step-by-step suggests that such a change in fiscal policies might more easily be made after the other policy instruments in the program have been in operation for some time.

Once again, the cost to the company of the suggested policy program should not be very different from the costs of the current program were it to be implemented. Providing the pollution control delay penalty is sufficiently large to induce the required action, no company will actually pay a penalty for delay. Consequently, the only costs companies will incur are the costs of meeting the existing effluent objectives (see pages 330-336).

The overall financial burden on the companies would further be reduced by the provision of loans with the repayments geared to the financial circumstances of the mill. Therefore, if anything, the costs to the company of the suggested policy program will be less than those associated with the implementation of the Ministry's current policy.

c. Cost to the Provincial and Federal Governments

Just as an effective pollution control delay penalty will not involve payment of the penalty by companies, so it will not raise revenue for the provincial government. The cost to the two levels of government, therefore, should remain the same as the costs already estimated on pages 336-340 that would be associated with the enforcement of the current policy.

Changes in the method of accelerated depreciation need not involve changes in the cost to government of this form of subsidy. The loans for pollution control, being at market rates of interest might affect the government's budget requirements but would not of themselves impose a cost on government.

If the pollution control delay penalties did result in substantial revenues then this would indicate a failure of the system which could be remedied by raising the charge and refund rates in PCDP1 and PCDP2, or just by changing the effluent objectives in PCDP2. In either case there would be no lasting source of revenue from these penalties if this were done.

Source: Ontario Ministry of the Environment
Status of Industrial Pollution Control in Ontario
Toronto, Appendix, Industrial Waste 410
Discharges in Drainage Basin
Basis, 1973

d. Economic and Social Effects on the Area
 Surrounding the Mills

The economic and social effects of the enforcement of the current policy have been discussed on pages 340-342. The suggested policy program, if adopted, would be an effective way of achieving the goals of the current policy.

Some differences in effects might result if the modified accelerated depreciation was introduced since it would encourage more labour intensive method of pollution control than is the case with the standard form of accelerated depreciation. This would tend to mitigate any unemployment effects of the pollution control policies. A system of tax credits would be even more useful for this purpose since it would assist those companies which are making insufficient profits to take full advantage of accelerated depreciation allowances.

e. Equity

The key issue that arises with respect to equity concerns the application of pollution control policies to a particular industry, albeit the one which is responsible for so much of the water pollution in Ontario. Perhaps the only really satisfactory solution to this problem is to apply the policy program to all establishments which discharge more than some specified quantity of wastes. Table VI 10 shows the number of plants in each of several industry groups which

TABLE VI 10

INDUSTRIAL DISCHARGES OF BOD₅ AND SUSPENDED SOLIDS IN
ONTARIO 1973

Average Daily Discharge lbs/day

1973

Industry	(1)SS in excess of 3,000	(2)BOD ₅ in excess of 10,000	(3)At least one of (1) & (2)
Pulp & Paper	23	22	23
Mining & Metallurgical	2		2
Basic Iron and steel	4	3	4
Petroleum & Petrochemical	2	1	2
Chemical Industry	2	2	3
Food Processing	1	1	1
Metal Working and Processing	2		2
TOTAL	36	29	37

Source: Ontario Ministry of the Environment, Status of
Industrial Pollution Control in Ontario, Toronto.
Appendix, Industrial Waste Discharges on Drainage
Basin Basis. 1973.

had average daily discharges in 1973 in excess of 10,000 lbs. BOD₅ and 3,000 lbs. SS. Of the 37 plants that exceeded one or other of these levels of discharge, 23 of them are in the pulp and paper industry. This means that by using these 'qualifying standards' of BOD₅ and SS discharges, the majority of pulp and paper mills are included in addition to a few important discharges in other industries. It is more equitable, however, to apply an environmental policy program to companies on the basis of explicit, environmental criteria rather than on a criterion of industry membership. This avoids the criticism that a particular industry is being unfairly singled out for harsh treatment by the government especially when it is good sense, from an environmental viewpoint, to address the policy program to all plants which are substantial dischargers of effluent.

Whether or not it is sufficient to base the pollution control delay penalties on BOD₅ and SS alone is an issue which need not be decided here. Other obvious candidates for inclusion in the scheme are COD and total dissolved solids. If they are not included then they will have to be regulated by the traditional methods which will be applied, in any case, to those plants which discharge less than the qualifying standards for BOD₅ and SS.

One other issue of equity remains and that concerns fair treatment of Ontario's industries with their counterparts and competitors in other jurisdictions.

It bears reiterating that the thrust of the suggested policy program is towards the fulfillment of the Ministry's objectives for each mill. If it is judged that this would be unfair to the companies concerned then it can only be concluded that what is unfair are the existing effluent objectives which would be retained under the suggested program. On the other hand, if the effluent objectives are deemed equitable, and by comparison with other jurisdictions they are none too harsh (section III-F), then a policy program directed towards ensuring that they are met cannot properly be regarded as inequitable merely because of the costs involved in meeting the effluent objectives.

f. Administration

The only part of the suggested pollution control program which raises serious questions of administrative feasibility is the pollution control delay penalty. These questions relate to the designation of which effluents are to be included, the measurement of the effluents, the setting of the effluent objectives, the use of any funds received as penalties.

The first two items are closely related since an effluent must be measurable within some tolerable degree of accuracy if the measurements are to form the basis for a pollution control delay penalty. At present, the mills are responsible for most of the effluent monitoring in Ontario supplemented by measurements taken by Ministry officials.

The well known difficulties of measuring even the most basic effluents: BOD5 and SS, suggest that account must be made for the errors which are unavoidable. Several options are available none of which is clearly superior:

- require company measurements according to standardized procedures with spot checks by the Ministry.
Deliberate fraud, though difficult to demonstrate, would be a criminal offence.
- require company measurements according to standardized procedures, with spot checks by the Ministry.
Adjust measurements of current discharges downwards by some specified percentage for the purpose of calculating the penalty. This would avoid penalizing companies merely because of unavoidable measurement errors. Deliberate fraud, which will be less likely than in the previous issue, would be a criminal offence.
- use the arithmetic average of company measurements and Ministry measurements for calculating the penalty.
An automatic error adjustment could also be used.

Once the effluent measurements are made, according to whatever principle is decided upon, they must be combined in an index for the purpose of calculating the pollution control delay penalty. An example of such an index is:

$$W_t = q_1 \text{BOD}_5 + q_2 \text{SS}$$

W_t is a measure of effluents discharged in year t .

It is the weighted sum of BOD_5 and SS where q_1 and q_2 are the weights given to a discharge of 1 lb of BOD and SS respectively. (Other effluents could be included if desired.) The weights should be related to the environmental damage associated with the discharge of the various effluents that are included in the scheme.

The charge and refund rates can be established in two main ways. They can be set directly by the legislature and periodically revised by that body, or they can be set and revised by the Ministry according to principles laid down by the legislature. These principles might include rate setting hearings at which interested parties could state their case. In any event, if the pollution control delay penalty is to be effective, it must be greater than the savings a company can make by not making the necessary expenditures on pollution control. The intensive study of two mills that is reported in Appendix G indicates that a delay penalty of 1 cent/lb of BOD_5 would induce some pollution control measures at both mills and a delay penalty of 2 cents/lb of BOD_5 would lead to quite substantial pollution control measures though not enough to meet the Ministry's current requirements. With the inclusion of suspended solids, however, the delay penalty would be more effective for BOD_5 as well in so far as reductions in suspended solids also have some effect in reducing BOD_5 .

The selection of the appropriate charge and refund rates is directly related to the ease with which they may be revised once they have been set.

If such revisions are likely to be reasonably simple, and this depends on the administrative procedure that is used, then the choice of the initial rates is not as crucial as it would be if rate adjustments are likely to prove problematical. As was noted earlier, the advantage of PCDP2 over PCDP1 is that the size of the penalty can be adjusted by changing the effluent objectives as well as or instead of the charge and refund rates. Since these have always been subject to revision in the past, changes in the effluent objectives may provide a more flexible means of altering the pollution control delay penalty than by relying on adjustments in the charge and refund rates.

If the pollution control delay penalty proves effective, it will not raise any significant sums of money in revenue. Indeed, such revenues will be a sign of failure which can be remedied by raising the penalty to a level that companies will avoid by installing pollution control on schedule. Any revenues that do result, however, will have to be disposed of in some way and it would seem that normal fiscal practices should apply. This means that the revenues would go to the provincial treasury rather than towards financing a specified function. Apart from being consistent with the traditional separation of the Government's revenue and expenditure decisions, this would avoid the possibility of relating the success of some other policy which involves government expenditures to an uncertain source of revenue.

F. Conclusion

The policy analysis presented in this chapter is by no means conclusive. Many issues have been raised which merit further examination and discussion. There is obvious room for more empirical work to test the assumptions, hypotheses and conclusions which occur throughout the chapter. However, the study of which this chapter is a part, was never intended to provide the final word on policies for pollution control in the Ontario pulp and paper industry. It was undertaken to provide information about the industry, to examine the problems of pollution and its control by the industry, and to present suggestions for new policies.

It is hoped that the data and arguments contained in this study will lead to a better understanding of the issues involved and that they will provide the basis for the development and implementation of new pollution control policies in the Province of Ontario.

BIBLIOGRAPHY

BIBLIOGRAPHY

- Arthur D. Little, Inc. Economic Analyses of Proposed Effluent Guidelines, Pulp, Paper and Paperboard Industry. Washington, D.C.: U.S. E.P.A. Office of Planning and Evaluation, Sept. 1973.
- Berkes, Fikret; Butler, Michael J.A.; Ott, Bruce; and Ross, William A., eds. Environmental Aspects of the Pulp and Paper Industry in Quebec. 2nd ed. Montreal: McGill University Press, 1972.
- Bohlen, R. "The Rule in Rylands v. Fletcher," University of Pennsylvania Law Review, Vol. 59, 1911, p. 298.
- C.C.H. Canadian Ltd. Canadian Income Tax With Regulations. 45th ed. 1974.
- "Canadian Industry Sets New Production Record Last Year." Paper Trade Journal, (Feb. 25, 1974).
- Canadian Pulp and Paper Association. Canadian Pulp and Paper Industry, Capacity Survey 1972-75. Montreal, 1973.
- Canadian Pulp and Paper Association. Industry Review and Recommendations. Montreal, Dec. 6, 1971.
- Canadian Pulp and Paper Association. "Profits After Taxes; Pulp and Paper Companies." Montreal, Aug. 24, 1973. (Mimeographed.)
- Canadian Pulp and Paper Association. Provincial Pulp and Paper Statistics - 1973. Montreal, Feb. 1974.
- Canadian Pulp and Paper Association. The Pulp and Paper Industry Statistical Bulletin. Montreal.
- Canadian Pulp and Paper Association. Reference Tables (Annual). Montreal.
- Canadian Pulp and Paper Association. Report on Effluent Conditions of the Pulp and Paper Mills in Ontario - Resurvey for Year 1971. Montreal.
- The Council of Pulp and Paper Producers of Quebec. The Competitive Position of the Quebec Pulp and Paper Industry. Montreal, Jan. 1972.
- Daly, R.A. and Co. The Canadian Forest Products Industry. Toronto, Jan. 1969.
- Dorcey, H.J. Economic Incentives for Water Quality Management. The University of Wisconsin Water Resources Centre, 1971.
- Durzi, K.S. The Pulp and Paper Industry: Ontario and Canada. Toronto: Research Branch, Dept. of Trade and Development, Nov. 1970.

- "Economic Impact of FWPCA Water Effluent Standards and Goals." Paper Trade Journal, (April 1, 1974), 38.
- Estrin, D., and Swaigen, J., eds. Environment on Trial. Toronto: Canadian Environmental Law Association, 1974.
- Food and Agriculture Organization. World Demand for Paper to 1975. Rome, U.N., 1960.
- Freitag, R.; Hastings, L.; Mercer, E.R.; Smith, M. "Ground Beetle Population Near a Kraft Mill." The Canadian Entomologist, Feb. 1973, Vol. 105, pp. 299-310.
- Gibson, Dale. "Constitutional Jurisdiction Over Environmental Management in Canada." University of Toronto Law Journal, (1973), 86.
- Guthrie, John A. The Newsprint Paper Industry - An Economic Analysis. Cambridge, Mass.: Harvard
- Hair, Dwight. Use of Regression Equations for Projecting Trends in Demand for Paper and Board. Washington, D.C.: U.S. Department of Agriculture, Dec. 1967.
- Haviland, W.E.; Takacsy, N.S.; Cape, E.M. Trade Liberalization and the Canadian Pulp and Paper Industry. Toronto: University of Toronto Press, 1969.
- Islam, Muhammed N. "Interregional Competition and Comparative Location Advantages of the North American Newsprint Industry." Unpublished Ph.D. dissertation, McGill University, 1973.
- Kates, Peat, Marwick and Co. Foreign Ownership and Forest-based Industries for the Select Committee on Economic and Cultural Nationalism of the Ontario Legislature Assembly. Toronto: J.D. Thatcher, Queen's Printer for Ontario, Oct. 1973.
- Kaufman, Fred. "The Role of the Private Prosecutor." McGill Law Journal, (1961), 102.
- Laskin, Bora. Canadian Constitutional Law. 3rd ed. Toronto: The Carswell Co. Ltd., 1969.
- Lockwood Publishing Co., Inc. Lockwood's Directory of the Paper and Allied Trades 1971/72. New York, 1972.
- Lundqvist, Lennart J. "Environmental Policy of Sweden in Relation to the 'Guiding Principles'." Paris, OECD, Oct. 4, 1973. (Mimeographed.)
- "Most New Canadian Capacity From Existing Mills and Equipment." Paper Trade Journal, (July 15, 1974), 24, 27.

- National Council of the Paper Industry for Air and Stream Improvement, Inc. "A Survey of Pulp and Paper Industry Environmental Protection Expenditures and Accomplishments - 1971." Report No. 7301, Jan. 1973.
- Ontario Ministry of the Environment. "Financial Assistance to the Pulp and Paper Industry to Accelerate the Water and Air Pollution Abatement Programs." Toronto, April 1973.
- Ontario Ministry of the Environment, Industrial Wastes Branch. Status of Industrial Water Pollution Control in Ontario as of December 31, 1971. Toronto, June 1972.
- Ontario Ministry of Natural Resources, Resources and Recreation. Report to Ministers on Tri-Partite Meetins with Manufacturers of Newsprint in Ontario and Quebec. Toronto, Dec. 1972.
- Ontario Ministry of Industry and Tourism, Industrial Development Branch. Industrial Survey 1973. Toronto.
- Ontario Ministry of Treasury, Economics and Inter-governmental Affairs, Economics Planning Branch. "Preliminary Report on Economic Policy Problems in the Ontario Pulp and Paper Industry," Toronto, 1972. (Mimeographed.)
- Ontario Water Resources Commission and Quebec Water Board. Ottawa River Basin - Water Quality and Its Control in the Ottawa River. Toronto: Ontario Ministry of the Environment, Vol. I - 1971, Vol. II - 1972.
- Organization for Economic Co-operation and Development. Pollution by the Pulp and Paper Industry. Paris, 1973.
- Private Planning Association of Canada. The Competitive Position of the Eastern Canadian Pulp and Paper Industry. Montreal, Feb. 1, 1973.
- Pulp and Paper International - Review Number 1973. Vol. 15, #8, July 1973.
- Rose-Ackerman, Susan. "Effluent Charges: A Critique." The Canadian Journal of Economics, VI (Nov. 1973), 4, 512-528.
- Slinn, Ronald J. "Current Trends in Market Pulp - Significance of COLC Easement." Paper Trade Journal, (April 1, 1974, 24-25.
- Statistics Canada. Corporation Financial Statistics 1970. Ottawa, June 1973.

- Statistics Canada, Manufacturing and Primary Industries Division. Manufacturing Industries of Canada: Ontario. Ottawa, 1969.
- Statistics Canada, Manufacturing and Primary Industries Division. Pulp and Paper Mills 1971. Ottawa, 1973.
- Udel, Jon G. "Supply and Demand for Newsprint in the U.S. Current and Future." Paper Trade Journal, (Jan. 21, 1974), 28.
- U.S., E.P.A. Economic Analysis of Proposed Effluent Guidelines - Pulp and Paper and Paperboard Industry. Washington, D.C.: E.P.A., Sept. 1973.
- Vermont Department of Water Resources. Development of a State Effluent Charge System, Feb. 1972, PB-210711.
- Wilke, Gerd. "New Paper Mills Eager to Expand." New York Times, March 17, 1974, p. 5.
- Wilson, Albert W. "100% Energy Goal for Mills: E.P.A. Guidelines Challenged." Pulp and Paper Journal, (March 1974), 114.
- Working Party in Demand Projection, Interdepartmental Committee for Review of the Canadian Pulp and Paper Industry. Consumption Projection for Paper 1970-1985. Ottawa, Sept. 1972.

A P P E N D I C E S

- A. Original research proposal, "Alternative Policies for Pollution Abatement: The Ontario Pulp and Paper Industry".
- B. Documentation regarding experience with policy instruments in other areas.
 - 1. A. Penman, "The Experience with the Effluent Charge Scheme of the City of Winnipeg (Feb. 14, 1974).
 - 2. John Demakes, "Effluent Charge Schemes in Canada (other than Winnipeg).
- C. Regulations concerning waste water effluents.
 - Federal:
 - 1. Chlor-Alkali Mercury Regulations
 - 2. The 1971 Federal Pulp and Paper Mill Effluent Regulations.
 - 3. Guidelines for the Pulp and Paper Effluent Regulations.
 - Provincial:
 - 1. Regulations Filed Under Provincial Acts to 26, March 1974.
- D. Statistical Series on Pulp and Paper Production in Ontario and Canada.
- E. Comments by Murray German and John Ralston of Ontario Ministry of the Environment regarding the effects of pulp and paper mill effluents on water quality under three alternative effluent conditions.
- F. Uses of each water body which receives pulp and paper mill effluents.
- G. "Analysis of Waste Treatment Alternatives: Eddy Forest Products Limited, Espanola and Abitibi Paper Co. Limited, Iroquois Falls" by Philip Wormwell and Peter Victor. Supplement by Peter Victor.
- H. Procedure for Estimating Mill Costs, Revenues and Profits.

